# DOCUMENT RESUME

ED 333 749 FL 019 248

| | |
|---|---|
| AUTHOR | No, Yongkyoon, Ed.; Libucha, Mark, Ed. |
| TITLE | ESCOL '90: Proceedings of the Eastern States Conference on Linguistics (7th, Columbus, Ohio, September 21-23, 1990). |
| INSTITUTION | Ohio State Univ., Columbus. |
| REPORT NO | ISBN-1-878594-07-9 |
| PUB DATE | 91 |
| NOTE | 372p. |
| AVAILABLE FROM | ESCOL Publications Committee, Department of Linguistics, The Ohio State University, 204 Cunz Hall, Columbus, OH 43210-1229 ($10.00). |
| PUB TYPE | Collected Works - Conference Proceedings (021) |
| EDRS PRICE | MF01/PC15 Plus Postage. |
| DESCRIPTORS | American Sign Language; Case Studies; Chinese; Evaluation Methods; French; German; Greek; Intonation; Italian; Javanese; Korean; Language Research; Morphology (Languages); Negative Forms (Language); Phonology; Spanish; *Structural Analysis (Linguistics); *Syntax; Tone Languages; Uncommonly Taught Languages; *Verbs; Vowels |
| IDENTIFIERS | *Discourse; Dyirbal; Markedness; Wh Questions |

ABSTRACT

Papers include: "Length and Structure Effects in Syntactic Processing"; Nantong Tone Sandhi and Tonal Feature Geometry"; "Event Reference and Property Theory"; "Function-Argument Structure, Category Raising and Bracketing Paradoxes"; "At the Phonetics-Phonology Interface: (Re)Syllabification and English Stop Allophony"; "Interpreting Reflexives in Coordinate NPs"; "Resultative 'de' as an Inflectional Morpheme in Chinese"; "Against an Ergative Analysis of Eastern Javanese"; "What Determines Anatipassive in Dyirbal?"; "In Defense of plus or minus FOC "; "The Bermuda Triangle of Syntax, Rhythm and Tone"; "Complement Structure of 'Tough' Constructions"; "Frequency, Markedness, and Morphological Change: On Predicting the Spread of Noun-Plural '-S' in Modern High German--and West Germanic"; "Discourse-Linking and the Wh-Island Extraction Asymmetry"; "One Word's Strength is Another Word's Weakness"; "Two Analyses of Korean Verb Inflections"; "Is INFL Universal? A Case Study of Korean"; "Vowel Underspecification in Jiyuan Chinese"; "Italian Psych Verbs in a Theory of Predication"; "Thematic Roles and French Dative Clitics: 'Lui' vs. 'Y'"; "Focus and the Discourse Dimension in Autolexical Theory"; "Aspectual Content of Compound Verbs"; "Thematic Structure and Verb Preferences"; "A-bar Movement in Spanish: Wh-questions, Focalizations, and Relative Clauses"; "Role of Plasticity in the Association of Focus and Prominence"; "A Unified Explanation of Deponent Verbs in Ancient Greek"; "Intonation and Focus in American Sign Language"; "'Any': Its Context Sensitivity and Meaning"; and "Negation and Aspect." (MSE)

***********************************************************************
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
***********************************************************************

ED333749

# ESCOL '90

BEST COPY AVAILABLE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

No, YongKyoon;
Libucha

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

FL019248

## Proceedings of the Seventh Eastern States Conference on Linguistics

# ESCOL '90

Proceedings of the Seventh

# EASTERN STATES CONFERENCE ON LINGUISTICS

The Ohio State University

September 21 – 23, 1990

Yongkyoon No and Mark Libucha
Editors

The Ohio State University

ISBN 1-878594-07-9

All articles Copyright ©1991

by the Ohio State University.

All rights Reserved.

## ESCOL Proceedings Available

*ESCOL '84: Proceedings of the First Eastern States Conference on Linguistics.* Held at The Ohio State University, Columbus, Ohio, September 28-30, 1984.

Papers from: The General Session
The Special Session on Agreement
Invited papers by: Eve Clark, Bernard Comrie,
Geoffrey Pullum, James McCawley

*ESCOL '85: Proceedings of the Second Eastern States Conference on Linguistics.* Held at the State University of New York at Buffalo, Buffalo, New York, October 3–5, 1985.

Papers from: The General Session
The Special Session on the
Parameters in Universal Syntax
Invited Papers by: Joan Bresnan, Joan Bybee,
Paul Hopper, David McNeill,
Gillian Sankoff, Michael Silverstein,
Carlota Smith

*ESCOL '86: Proceedings of the Third Eastern States Conference on Linguistics.* Held at the University of Pittsburgh and Carnegie-Mellon University, October 10–12, 1986.

Papers from: The General Session
The Special Session on
Linguistics at Work
Invited Papers by: Charles Fillmore, Lily Wong
Fillmore, Martin Kay,
George Miller

*ESCOL '87: Proceedings of the Fourth Eastern States Conference on Linguistics.* Held at the Ohio State University, Columbus, Ohio, October 2–4, 1987.

Papers from: The General Session
The Special Session on
Variation and the
Theory of Grammar
Invited Papers by: Nina Hyams, Larry Hyman

*ESCOL '88: Proceedings of the Fifth Eatern States Conference on Linguistics.* Held at the University of Pennsylvania, Philadelphia, Pennsylvania, September 30–October 2, 1988.

Papers from: The General Session
Invited Papers by: Mark Aronoff, Laurence Horn,
Barbara Partee, Michael Tanenhaus

*ESCOL '89: Proceedings of the Sixth Eastern States Conference on Linguistics.* Held at the University of Delaware, Newark, Delaware, October 6–8, 1989.

Papers from: The General Session
Invited Papers by: Stephen R. Anderson, Bernard Comrie

*ESCOL '90: Proceedings of the Seventh Eastern States Conference on Linguistics.*

---

| | | |
|---|---|---|
| Cost per volume: | Individuals: | $ 10.00 |
| | Institutions: | $ 12.00 |

Please mail requests to: ESCOL Publications Committee
Department of Linguistics
The Ohio State University
204 Cunz Hall
Columbus, Ohio, 43210-1229, USA

Checks or money orders should be made payable to: The Ohio State University.

# ACKNOWLEDGEMENTS

This volume contains papers presented at the seventh annual meeting of the Eastern States Conference on Linguistics (ESCOL), September 21–23, 1990. The conference was sponsored by the Department of Linguistics, The Ohio State University.

The conference was made possible through generous donations of time by the faculty, students, and staff of the OSU Department of Linguistics. Special thanks go to members of the Program Committee, by whose hands the sessions were planned and papers were selected: Hee-Rahk Chae, Younghee Chung, Michelle Jackson, Donald Winford, and Arnold Zwicky. The other aspects of the conference were taken care of by the organizer Brian Joseph, whose efforts we appreciate.

The conference was funded by the Center for Cognitive Science, the College of Humanities, and the Office for Research and Graduate Studies of the Ohio State University. The conference organizers greatly appreciate the help of these organizations.

There were 34 papers presented at the conference, 27 of which are contained in this volume. Robert Ladd's ***One Word's Strength is another Word's Weakness*** was an invited talk for the Parasession, Focus: Its Phonology and Syntax. ***In Defense of [+/- foc]*** by Thorstein Fretheim and Radi Alice Nilsen was not presented at the conference but is included here. We thank all authors for facilitating publication of this volume by submitting camera-ready copy.

Finally, we appreciate the aid of the Department of Linguistics at the Ohio State University in making this publication possible.

Yongkyoon No
Mark Libucha

Editors

## TABLE OF CONTENTS

Antonisse, Peggy
*Length and Structure Effects in Syntactic Processing* ................ 1

Ao, Benjamin
*Nantong Tone Sandhi and Tonal Feature Geometry* ................ 8

Bayer, Sam
*Event Reference and Property Theory* ................ 16

Chae, Hee-Rahk
*Function-Argument Structure, Category Raising and Bracketing Paradoxes* ................ 28

Churma, Donald
*At the Phonetics-Phonology Interface: (Re)syllabification and English Stop Allophony* ................ 40

Cowart, Wayne
*Interpreting Reflexives in Coordinate NPs* ................ 55

Dai, John
*The Resultative* de *as an Inflectional Morpheme in Chinese* ................ 67

Davies, William
*Against an Ergative Analysis of Eastern Javanese* ................ 79

Dryer, Matthew
*What Determines Antipassive in Dyirbal?* ................ 90

Fretheim, Thorstein and Randi Alice Nilsen
*In Defense of [+/- foc]* ................ 102

/ Hsiao, Yuchau
*The Bermuda Triangle of Syntax, Rhythm and Tone* ................ 112

Hukari, Thomas and Robert Levine
*The Complement Structure of* tough *Constructions* ................ 124

✓ Janda, Richard D.
*Frequency, Markedness, and Morphological Change: On Predicting the Spread of Noun-Plural -S in Modern High German–and West Germanic* ................ 136

Kraskow, Tina E.
*Discourse-linking and the Wh-Island Extraction Asymmetry* ................ 154

Ladd, Robert
*One Word's Strength is another Word's Weakness* ................ 166

Lapointe, Steven
*Two Analyses of Korean Verb Inflections* .......... 187 ✓

Lee, Young-Suk
*Is INFL Universal? A Case Study of Korean* .......... 204 ✓

Lin, Yen-Hwei
*Vowel Underspecification in Jiyuan Chinese* .......... 215

Rubin, Edward
*Italian Psych Verbs in a Theory of Predication* .......... 227

Sachs, Hilary
*Thematic Roles and French Dative Clitics:* **Lui** *vs.* **y** .......... 240

Schiller, Eric
*Focus and the Discourse Dimension in Autolexical Theory* .......... 249

Singh, Mona
*The Aspectual Content of Compound Verbs* .......... 260

Stowe, Laurie
*Thematic Structure and Verb Preferences* .......... 272

Toribio, A. Jacqueline
*A-bar Movement in Spanish:*
*Wh-questions, Focalizations, and Relative Clauses* .......... 286

Vallduvi, Enric
*The Role of Plasticity in the Association of Focus and Prominence* 295

Whaley, Lindsay
*A Unified Explanation of Deponent Verbs in Ancient Greek* .......... 307

Wilbur, Ronnie B.
*Intonation and Focus in American Sign Language* .......... 320 ✓

Zhou, Minglang
**Any***: Its Context Sensitivity and Meaning* .......... 332 ✓

Zucchi, Alessandro
*Negation and Aspect* .......... 344

ESCOL '90 1-7

# LENGTH AND STRUCTURE EFFECTS IN SYNTACTIC PROCESSING

Peggy Antonisse
University of Maryland

In this paper, I will report the results of two experiments which attempt to distinguish between two different locality factors claimed to affect attachment preferences in parsing. These factors have been informally characterized as Length and Structure and have generally been seen as mutually exclusive. Each has been claimed to explain similar effects in certain kinds of attachment ambiguities. The results of the first experiment suggest various interpretations which are explored in the second experiment. The results of that experiment question a locality factor in general. The two experiments, taken together, are clearer about eliminating rather than implicating factors, and consequently they should be viewed as initial experiments in a research program investigating the influence of the various factors which can affect syntactic processing.

## The Length and Structure hypotheses

The most articulated form of the Length hypothesis can be found in Frazier & Fodor's (1978) Sausage Machine model. The model has a two-stage design, the first stage of which assigns lexical category and structure, up to the phrasal level, to units of approximately 7 +/- 2 words. This limit roughly corresponds to short term memory considerations and reflects a pressure to structure quickly - even if erroneously - rather than allow material to remain unstructured. Each structured unit is in turn sent to the second stage which links the results into a completed phrase marker. Thus the second stage inherits a reduced number of internally structured units, and both time and storage demands are minimized. Because of this design, " the verbal particle *up* in (1) is more naturally associated with *smashed* in the lower clause than with *called* in the higher clause":

(1) Joe called the friend [ who had smashed his new car up.

The two-stage design and its associated parsing preferences Right Association and Minimal Attachment were later challenged by Wanner (1980), who notes that a lower attachment preference persists even when the entire sentence is well within the 7 +/- word limit:

(2) John said [Bill died yesterday.

In their reply to Wanner, Fodor & Frazier (1980) distinguish between Local Association, which is tied to the two-stage design and applies to material which has not yet been sent to the second stage, and Right Association, which could be seen as a general scheduling principle and thus accounts for examples like (2). Consequently the similar attachment preferences in (1) and (2) are for different reasons, and the model still "predicts different effects for constituents of different lengths." When multiple attachment sites are available, and Length considerations would suggest that the first attachment site had been sent to the second stage, the parser would "prefer the closest possible attachment site," where "close" is defined in terms of string length.

Milsark (1983) points out a different kind of example where "long" intervening material does not exhibit the predicted local (or Right) association:

(3) Susan bought a house with two bedrooms, a garage, and a fireplace for Mary.

where *for Mary* is more easily associated with *bought* than with *fireplace*. As a result, all the above examples allow him to characterize the locality principle of the parser as one that is Structurally governed: "The parser is upward bounded by S". (3), which lacks an S, will not be subject to the same preferences as (1) and (2). On a strict interpretation of this principle, the attachment of an adverb over an S would be unparseable, regardless of the length of the intervening material:

(4) John said [he will leave yesterday.

When the parser must make a choice between multiple attachment sites, this might translate to "prefer the attachment site in the current clause." Again preferences are for the closest possible attachment site, but this time "close" is defined in the structural terms of the phrase marker.

In summary, both hypotheses claim a preference for attaching a sentence final element within an embedded clause :

(5) Tom said [that Bill had taken the cleaning out yesterday.

(6) Joe called the friend [who had smashed his new car up.

In (5), Tom could have made his statement yesterday, or Bill could have performed his task yesterday, but upon reaching the adverbial, which requires attachment to one verb, preferences seem to favor the latter interpretation. In (6), one can "call a friend," "smash a car," "call a friend up," or smash a car up." Again, upon reaching "up" preferences seem to be for the lower, closer attachment. Crucially, while claiming the same preference in terms of locality, the two hypotheses do so for different reasons: A Length hypothesis predicts the preference because the alternative is too far away, and a Structure hypothesis predicts the preference because the alternative is outside the current clause.. However, distinct predictions are made for sentences such as (3) which is long but lacks an intervening S node and (4) where an S node is present but length is not a factor.

## Experiment 1

Processing research has moved away from considering the kinds of introspection supporting these hypotheses as being accurate measures of processing behavior. Consequently it seemed worthwhile to test these hypotheses via more "on-line" experimental techniques which could then be submitted to statistical analysis. However, given the difficulty of designing an experiment to measure attachment preferences, the goal shifted from accounting for the preferences to instead measuring and comparing the locus of difficulty when a "non-local" attachment is forced and the character of the intervening material is controlled. By controlling for the factors of Length and Structure we can measure which exerts the most influence in a situation roughly modeled on examples 5) and 6).

Sample sets are listed below in 7) and 8). Both verb-particles and time adverbials were included to ensure generality across the conditions. There were, however, problems with the verb-particle data which are still under analysis and will not be discussed here.

### Characteristics of the Intervening NP in (7) and (8)

(+L = 9 words) (-L = 4-5 words) (+E = Embedded clause) (-E = no Embedded clause)

(7) Verb - particle
+L+E a. He wiped $_{NP}$[the table $_{S}$[which (e) swayed in the corner of the kitchen]] off.
+L-E b. He wiped $_{NP}$the table in the corner of the new kitchen] off.
-L+E c. He wiped $_{NP}$the table $_{S}$[ which (e) swayed]] off.
-L-E d. He wiped $_{NP}$[the table in the corner]] off.

(8) Time adverb
+L+E a. Dick will sell $_{NP}$[the old dented wreck of a car $_{S}$[ he restored (e)]] tomorrow.
+L-E b. Dick will sell $_{NP}$the very old and dented wreck of a car] tomorrow.
-L+E c. Dick will sell $_{NP}$the car $_{S}$[ he restored (e)]] tomorrow.
-L-E d. Dick will sell $_{NP}$[the old dented car] tomorrow.

In the time adverbial set, "tomorrow" needs to attach to the verb marked with future tense (here, "will sell"), and must do so over intervening material controlled for our two factors. In (8a), the intervening material is both "long" and "structured," and most closely matches (5) and (6) in these factors. (8b), however, has intervening material which is only "long" and (8c) has material which is only "structured." The (8d) condition has intervening material which is neither long nor structured.

(9) illustrates the different predictions made by the two hypotheses, plus a third possibility that the original assumption of mutual exclusivity was wrong, and that both Length and Structure contribute to processing difficulty. Difficulty is measured by both significant reaction time differences and "error" rate differences - where the rejection of the sentence as acceptable is counted as an error. ( The exact task requirements and experimental design will be discussed below). In (9) ">" is to be interpreted as "is significantly more difficult to process than."

(9) Predictions: (Reaction times or Error rates)
Length hypothesis: a. b. > c. d.
Structure hypothesis: a. c. > b. d.
Interaction: a. > b. c. d.

Thus, a Length hypothesis predicts processing difficulty for only (a) and (b), both being +L, and the Structure hypothesis predicts processing difficulty for only (a) and (c), both being +E. The Interaction hypothesis predicts that only (a), being both +L and +E, will be significantly more difficult to process than any other condition.

While the Predictions are only explicit about the Length and Structure alternatives, two secondary factors were also considered to possibly contribute to processing difficulty. First of all, the test sentences contained an equal number of subject and object relatives in the embedded clause condition. To comply with the necessity of matching number of intervening words, the subject relatives were unreduced and the object relatives were reduced. Secondly, the position of the direct object head noun was balanced between being delayed (preceded by some combination of adjectives and/or prepositional phrases) and undelayed. This head delay condition systematically varied the quantity of material associated with either the head NP or the embedded clause. To illustrate, In (8a) the head NP "car" is delayed and the embedded clause has a reduced object relative. An example like "I paid the band [ who will sing for the rock and roll party earlier " exhibits the opposite conditions of an undelayed head NP, "the band," and an unreduced subject relative. These secondary conditions were independently manipulated. Further, the use of prepositional phrases was controlled as much as possible to discourage ambiguous attachment. These secondary factors are still under analysis.

Experimental Task & Design

16 Univ. of Maryland undergraduates participated in the experiment for extra credit. Each subject saw 24 test sentences embedded in 48 ungrammatical and 24 grammatical fillers. The subjects were divided into four groups, and the four versions of each set were rotated among the groups using the Latin Square design. The experimental task was a speeded grammaticality judgement task whereby the subjects saw a serially presented sentence with a new word appearing every 300 msec. Upon presentation of the final word, identified by its appearance with a period following it, subjects accepted or rejected the sentence as a sentence of English by pressing either a red (reject) or green (accept) button. Subjects were instructed to view awkward sentences as acceptable if they could plausibly be uttered in casual speech and to reject sentences which were clearly "not English". Because the judgement coincided with the problematic final word of the test sentences, reaction times and rejection rates were interpreted as a measure of the ease or difficulty of incorporating that item into the preceding material.

The results are presented in Table 1:

Table 1

Results for the Adverb condition (16 subjects): Mean reaction time in msec. (% correct)

| | Structure | | | |
|---|---|---|---|---|
| Length | + | - | Mean | Length effect |
| + | a. 1083 (88%) | b. 799 (92%) | 938 (90%) | 31 (n.s) |
| - | c. 1122 (83%) | d. 831 (94%) | 969 (89%) | |
| Mean | 1102 (86%) | 815 (93%) | | |

Structure effect 287 $p < .01$

## Discussion of Experiment 1 results

There were no significant differences in accuracy, and the acceptance rate of these sentences was high. In terms of reaction times, the difference between the +L condition (the mean of (a) and (b) combined) and the -L condition (the mean of (c) and (d) ) was not statistically significant. Though not significant, the trend is actually in an unpredicted direction with the -L mean higher than the +L mean. There is, however, a significant Structure effect ($p < .01$) to be found in the contrast between the +E condition (mean of (a) and (c)) and the -E condition (mean of (b) and (d) ) This supports the prediction of the Structure hypothesis over those of the Length or Interaction hypotheses. In terms of that hypothesis, and allied with the Milsark claim, the results of the experiment indicate that adverbial attachment "over" a clause boundary is significantly more difficult than over material which does not include a clause boundary. - regardless of string length. However, when we informally represent the results in terms of factors :

Adverb; 2 clause [+E] > Adverb; 1 clause [-E]

we can see that the design of the experiment allows another interpretation of the results. (Again, ">" is to be interpreted as "is significantly more difficult to process than.")

Forster (1970), using a rapid serial visual presentation (RSVP) technique, reports an increased processing difficulty of two clause sentences over one clause sentences. There was a significant difference between the mean number of words reported for simple and complex sentences, which was maintained under various experimental conditions. However, conflicting results are reported in Rayner & Frazier (1987) where, using a reading time measure, no significant differences were found between sentences with an embedded clause (10) and those without (11):

(10) The contestant imagined [ that the small tropical island would be completely deserted.

(11) The contestant imagined the small tropical island in the middle of the Pacific.

Given these conflicting results, we might question whether the results obtained in the first experiment were merely due to the presence of two clauses and not to the attachment of the adverb over an intervening clause boundary. Further, if presence of multiple clauses is truly a significant factor, the adverbial attachment itself may not even be a contributing factor.

## Experiment 2

To test these alternatives, a second experiment was designed. The experimental task and conditions were the same as in the first experiment. A sample set is presented in (12):

(12) Adverb attachment

| | |
|---|---|
| a. Non-local attach. | a. Ann missed $_{NP}$[the bus $_{C}$[she takes (e) school ]] yesterday. |
| b. Local attach. | b. Ann will miss $_{NP}$[the bus $_{C}$[she took (e) to school ]] yesterday. |
| c. No attach. | c. Ann missed $_{NP}$[the bus $_{C}$[ she takes (e) to school. |

Since Length did not contribute to the results of the first experiment, that factor was not manipulated in the second experiment. Embedded clauses averaged six words and all conditions have two clauses. The (12a) condition mirrors the +E condition of the first experiment, while the (12b) condition requires a local, embedded clause attachment. Finally, the (12c) condition has two clauses but no adverb. The varying predictions are presented in (13):

(13) Predictions (Reaction times or Error rates)
a. = b. = c. Two clause presence ; (adverb = no role )
a. > b. c. Adverb attachment plus character of embedded clause (Milsark)
a. b. > c. Adverb attachment plus two clause presence

Though we have not been explicit on this point, notice that adverbial attachment alone cannot be responsible for the results of the first experiment. As the only constant factor in all four conditions, we would have observed the a = b = c = d pattern. Similar patterning ( a = b = c) would yield the opposite possibility for Experiment 2; i.e. that adverbial attachment plays no role in the results. The original structure - based locality hypothesis is represented second in (13) and admits of the two factors; adverbial attachment and clause boundary. Last is the third hypothesis combining adverbial attachment and two clause presence, suggesting that locality is not at issue. The results are presented in Table 2.

Table 2

Results for Adverb attachment (18 subjects); Mean RT in msec. (% correct)

| | | |
|---|---|---|
| Non-local attach. | 1277 (79%) | |
| Local attach. | 1384 (83%) | |
| No attach. | 1023 (97%) * | * p <.01 |

The results were statistically significant for both reaction time and accuracy (p < .01) There was no significant difference between local and non-local attachment, but both were significantly more difficult to process that the No attachment condition. Informally this can be characterized as:

Adv.; non-local attach. = adv. local attach. > No adverb; 2 clause

## Discussion

The fact that the presence of the adverb exerted a significant influence allows us to eliminate the possibility that the adverbial attachment is playing no role. We have support, instead, for our third prediction - i.e. that adverbial attachment plus the presence of two clauses accounts for our results. The main question to address is how to interpret the results favoring this two clause presence as a factor contributing to adverbial attachment difficulty. In the first experiment, we were led to think that it was crossing the clause boundary that was contributing to the processing difficulty. Somewhat surprisingly, however, the Local Attachment condition, in Experiment 2, exhibits obvious processing difficulty This leads us to consider that it is the presence of two verbs, rather than an intervening S, which gives us the patterning of local and non-local attachments together. Where we were expecting a locality effect, we seem to have gotten one in terms of possibility, with the two verbs being viewed as possible attachment sites for the encountered adverb. For the local attachment possibility to cause as much processing difficulty as the non-local attachment, it seems that tense specification for the two verbs are either inaccessible or being ignored at the decision point or being equally considered, and evaluated, Further, we need to understand the varying contributions of the factors we have identified through these experiments. Specifically, we know that the Adverb; 2 clause ( local or non-local) condition is significantly more difficult to process than either the Adverb; 1 clause condition (Exp. 1) or the No adverb; 2 clause condition (Exp. 2) This is informally shown in (14):

(14) Results of Experiments 1 & 2
No adverb; 2 clause
Adverb; 2 clause >
Adverb; 1 clause

In order to determine the relative costs of these two factors, we plan to test the relationship between the Adverb;1 clause and the No adverb; 2 clause conditions. If there are significant results, we will have a measure of the relative influences of adverbial attachment and clause presence on processing.

## Conclusion

The results of these two experiments are clear about what we can eliminate as significant factors in adverbial attachment but leave open a number of possibilities. We know that no single factor, such as adverbial attachment alone or presence of two clauses alone gives us the processing difficulty. Further, adverbial attachment constrained in terms of locality ( either "length" (Exp. 1) or "structure, " as intended by Milsark (Exp. 2) is also not responsible for our results. Remaining to be explored are the possible influences of Head position and Subject/Object Relatives and especially the relative influences of the two identified factors of adverbial attachment and two clause presence. The results suggest that it is the multiple verb attachment sites exerting the influence in adverbial attachment, though "verb" and "clause" are obviously confounded in these experiments. Ways of disentangling those two elements are currently being explored. The conclusion of these two experiments is that in the condition of sentence final adverbial attachment, the presence of two clauses (or verbs) contributes significantly to processing difficulty. It is anticipated that results from work in progress will clarify the nature of the factors which can influence syntactic processing, and in so doing will shed light on the design of the human sentence processing mechanism.

## References

Forster, K.I. (1970) "Visual Perception of Rapidly Presented Word Sequences of Varying Complexity" Perception & Psycholinguistics 8(4) : 215-221.

Fodor, J.D. & L. Frazier (1980) "Is the Human Parsing Mechanism an ATN?" Cognition 13: 417-459.

Frazier, L & J.D. Fodor (1978) "The Sausage Machine; A New Two - Stage Parsing Model" Cognition 8 : 291-325.

Rayner, K. & L. Frazier (1987) "Parsing Temporarily Ambiguous Complements" The Quarterly Journal of Experimental Psychology 39A:657-673.

Milsark, G. L. "On Length and Structure in Sentence Parsing" Cognition 13:129-34.

Wanner, E. (1980) "The ATN & the Sausage Machine: Which One is Baloney?" Cognition 8 : 209-226.

ESCOL '90 8-15

# NANTONG TONE SANDHI AND TONAL FEATURE GEOMETRY

Benjamin Ao
The Ohio State University

The nature and the position of tonal features in phonological feature geometry have attracted the interest of many phonologists. In recent studies of feature geometry, most authors either assume or argue that tonal features are suprasegmental features on an autonomous tier associated directly or indirectly with the skeleton tier (CV's or X's) or with the mora (e.g. Pulleyblank & Archangeli 1986, Hyman 1989, Inkelas 1987, Odden 1988, Yip 1988 etc.). For example, the feature geometry assumed in Pulleyblank & Archangeli 1986:18 is shown in (1).

```
(1)                      X                   Skeleton
                         |\
    Root Node     son----o \
                 nas----/|  o                Tonal Node
                       / |  |\
             voiced   /  |  | upper
                   \ /   |  |
 Laryngeal Node     o    | raised
                   /     |
        spread glottis   |
                         o----cont  Supralaryngeal Node
                         |
    Place Node           o
                         :
                         :
                          (Pulleyblank & Archangeli 1986)
```

In this paper, I analyze a tone sandhi pattern in Nantong, a Chinese dialect spoken in the northern Yangtze Delta, which clearly shows that tonal features must be under the segmental root node, and are in fact daughters of the laryngeal tier.

Nantong has five distinctive tones, two of which may be realized on a syllable with a final glottal stop. For example:

```
(2)             L              HL            HL
                |              |/            |/
               ti:  "ladder"  ti:  "go"     ti?  "iron"


 MH            LM              H             H
 |/            |/              |             |
ti:  "raise"  ti:  "ground"   ti:  "body"   ti?  "flute"
```

There is a tone sandhi pattern in which the glottal stop drops at the end of a H toned syllable if followed by a sonorant segment. At the same time, the preceding vowel lengthens, and the syllable loses its H tone and becomes M toned, as shown in the rightmost column in (3a). This process is very productive. It occurs in

```
(3)
a. H             H   H                  M  H
   |             |   |                  |  |
  sε? "ten"     sε?tcü: "nineteen"     sε:lo? "sixteen"

                 H  HL                  M  HL
                 |  |/                  |  |/
                sε?pa?  "eighteen"     sε: i? "eleven"

                 H   LM                 M  LM
                 |   |/                 |  |/
                sε?phu: "ten times"    sε: @r "twelve"

   H             H     LM               M L
   |             |     |/               | |
  lo? "record"  lo?tchien "rec image"  lo:iN "rec sound"

   H             H   L                  M  MH
   |             |   |                  |  |/
  mo? "wood,    mo?kuo:   "papaya      mo:min "kapok
       tree"           (tree melon)"     (tree cotton)"

   H             H    MH                M  MH
   |             |    |/                |  |/
  Lo? surname   Lo?tchü:               Lo: ü:

cf.
b. HL            HL HL                  HL H
   |/            |/ |/                  |/ |
  pa? "eight" pa?pa?  "eighty eight" pa?lo? "eighty six"

c. H             H  HL                  H  H
   |             |  |/                  |  |
  vu: "five"  vu:pa?  "fifty eight"  vu:lo? "fifty six"
```

regular compounds as well as in numeral compounds and personal names, which are ad hoc combinations of two or three monosyllabic morphemes. Moreover, this process is subject to some syntactic and morphological restrictions. It does not occur between a subject NP and its predicate VP or between a verb and its object NP, e.g. [$_{NP}$pio?(H)] [$_{V}$plan(LM)t@(M)] ("The meat is done") but *[$_{NP}$pio:(M)] [$_{V}$plan(LM)t@(M)]; [$_{VP}$sa?(H) [$_{NP}$No:(MH)tshi:(H)]] ("brush the teeth") but *[$_{VP}$sa:(M) [$_{NP}$No:(MH)tshi:(H)]]. It does not occur in phrases and unfamiliar personal names, but occurs as soon as the phrases are lexicalized and become compounds, or as the personal names become familiar.

In view of pa?(HL)lo?(H) and vu:(H)lo?(H), it is impossible to treat sɛ:(M)lo?(H) (from sɛ?(H) + lo?(H)) as the result of one rule that lowers a H tone before a sonorant and a second that deletes a syllable-final glottal stop before a sonorant, because this would incorrectly predict that the first H tone in vu:(H)lo?(H) should lower and the first glottal stop in pa?(HL)lo?(H) should drop.

An alternative two rule analysis is to lower a H tone to a M tone if it is associated to a syllable with a final glottal stop, and then delete a glottal stop if it is at the end of a syllable associated with a M tone. Although this ananlysis generates the correct forms, it is problematic. First of all, the conditions for H tone lowering and for glottal stop deletion stated in these rules are both phonetically unmotivated and typologically unattested to my knowledge. Moreover, the relatively complex and specific cross-reference to tonal specification and to syllable structure in both rules makes it unlikely that they represent two separate processes. Finally, both H tone lowering and glottal stop deletion occur in the same phonological, morphological and syntactic environment, and one does not occur without the other also occurring. This generalization cannot be captured by the proposed two rule analysis.

A more feasible alternative is this: Assume that in Nantong, each tone is specified on the syllable-final segment. Thus, in morphemes like sɛ?(H) "ten" or lo?(H) "six", the glottal stop is associated with a H tone. If the glottal stop is not deleted in the process of phonological derivation, its H tone flops to the preceding vowel; otherwise, if it is deleted, then the vowel defaults to M tone. In other words, we assume that H tone lowering and glottal stop deletion result from one and the same rule. Accordingly, the derivation of sɛ:(M)lo?(H) "sixteen" runs as follows:

```
(4)      UR      ?-Deletion     High Tone      Default Tone
                 & Comp. Leng.  Flopping       Assignment

     H   H              H              H              M   H
     |   |    -->       |      -->     |      -->     |   |
    sɛ?lo?          sɛ:lo?         sɛ:lo?          sɛ:lo?
```

That morphemes like sɛ?(H) "ten" are underlyingly specified with a H tone is supported by the fact that they behave as a natural class with H toned open syllable morphemes. Specifically, in a compound with three or more syllables, the second syllable is always H toned if the first one is H toned, whether the first syllable is open or closed. For example:

| | | |
|---|---|---|
| (5) | bin(H)the(LM) | "lentil beans" |
| | bin(H)the(H)ko?(HL)tsi(L) | "lentil bean pods" |
| | lo?(H)the(LM) | "green beans" |
| | lo?(H)the(H)ko?(HL)tsi(L) | "green bean pods" |
| cf. | tshε?(HL)the(LM) | "red beans" |
| | tshε?(HL)the(L)ko?(HL)tsi(L) | "red bean pods" |
| | m@(MH)the(LM) | "soy beans" |
| | m@(MH)the(H)ko?(HL)tsi(L) | "soy bean pods" |

The assertion that there is compensatory lengthening involved in the derivation in (4) is based on the fact that underlyingly, the vowel /ε/ only occurs as a short vowel before /n/ or /?/. The only case where it does occur as a long vowel in an open syllable is when the syllable-final /n/ or /?/ is deleted before the retroflex vowel /@r/, or when the H toned syllable-final /?/ is deleted before a sonorant. The most logical explanation for this vowel's distribution is that it occurs as a long vowel only in a derived environment as the result of compensatory lengthening.

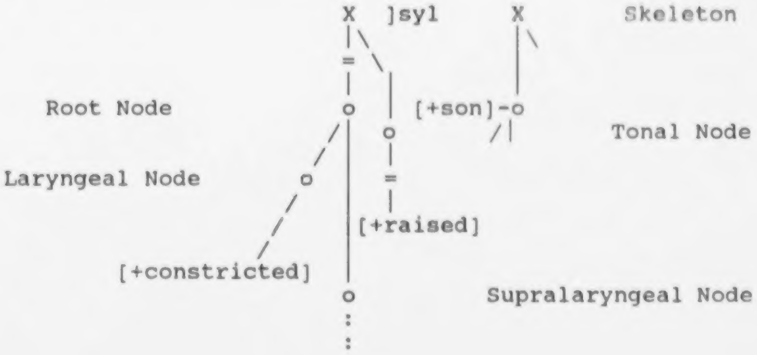
The treatment of the M tone as the default tone in Nantong is independently motivated by another tone sandhi process which raises L tone to M tone before a syllable with any of the five tones, as shown in (6). The analysis for that is that the L tone syllable undergoes a tone deletion rule and receives a M tone by default.

| | | |
|---|---|---|
| (6) | xuo:(L) | "flower" |
| | cin(M)xuo:(L) | "fresh flower" |
| | xuo:(M)cien(L) | "flower scent" |
| | xuo:(M)phiN(MH) | "flower bottle (vase)" |
| | xuo:(M)fεn(H) | "flower powder (pollen)" |
| | xuo:(M)tin(HL) | "flower shop" |
| | xuo:(M)phi:(LM) | "floral envelope" |

With the analysis proposed above, we can now examine the position of tonal features in the feature hierarchy. Assuming Pulleyblank & Archangeli's representation in (1), the only possible formulation of glottal stop deletion would be to delink the root node of the glottal stop from its timing unit, since the timing unit must be preserved for subsequent compensatory lengthening of the preceding vowel. The undesired effect of this is that deletion of H cannot be automatic, but would have to involve an additional operation, as in (7).

Clearly, Rule (7) violates the convention that phonological rules operate on single elements. Given the liberty to delink under multiple nodes in one rule, nothing prevents us from simultaneously delinking arbitrary sets of features and/or class nodes across the feature hierarchy. This is undesirable, since it would generate many unattested phonological rules, and seriously undermine the original motivation for organizing phonological features into groups dominated by hierarchical class nodes, which was to characterize natural phonological rules as affecting one class node and thereby affecting all and only the features dominated by that node. The failure of (7) to treat the delinking of root node and the H tone feature as the delinking of a single class node argues that the representation in (1) is inadequate.

(7) ?-Deletion & H-Delinking



It is clear that in order to formalize the Nantong tone sandhi in question, tonal features and laryngeal features must be under the same class node. One way to achieve this effect is to remove the laryngeal node in (1) and put all laryngeal features and tonal features under a common node associated with the timing unit (C, V or mora). This approach is undesirable, since it entails that phonological rules operating on root nodes cannot affect laryngeal features. Thus, to formalize a common gemination process such as C[-cont] -->

[αplace,ßvoice] / ____ C[-cont,αplace,ßvoice], one would have to write two rules: one merges the adjacent root nodes and another spreads the laryngeal feature for voicing.

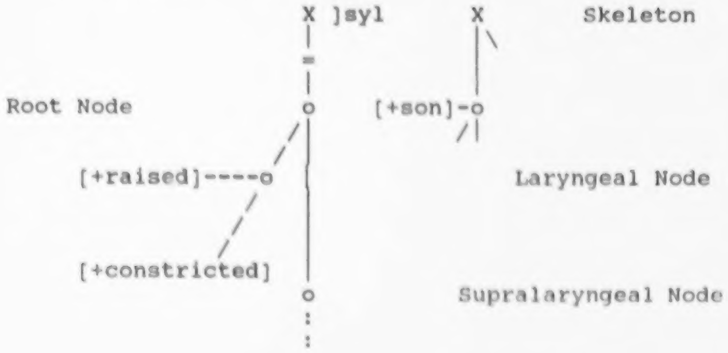
This motivates a modification of tonal feature geometry so that tonal features are under the root node. It is well known that pitch variations are the result of variation in position and muscular tension of the vocal cords in the larynx. In addition, there is ample evidence that tonal features (pitch levels) interact with laryngeal features (phonation types) in both diachronic and synchronic phonological processes (e.g. Ladefoged 1964, Ohala (1973), Matisoff 1970 & 1973, Maran 1971 etc.) A number of authors (e.g. Halle & Stevens 1971, Ladefoged 1973 etc.) have explored the possibility of treating tonal features as laryngeal features. Following this practice, it is reasonable to assume that tonal features are placed under the laryngeal node on a par with other laryngeal features, although the exact number, content and organization of the new set of laryngeal features are subject to further studies.

Assuming that [upper] and [raised] are the correct tonal feature representations, and assuming that these features are associated with the laryngeal node, (1) must be minimally modified as follows:

```
(8)                      X                   Skeleton
                         |
    Root Node     son----o
                 nas----/|
                 upper / |
             raised | /  |
                   \|/   |
             voiced-o    |              Laryngeal Node
                   /     |
        spread glottis   |
                         o----cont   Supralaryngeal Node
                         |
    Place Node           o
                         :
                         :
```

With this modification, (7) can be revised as in (9). With one delinking operation, (9) simultaneously deletes the glottal stop and the H tone feature associated with it. The root node of the vowel preceding the deleted glottal stop then spreads to the timing unit vacated by the deletion, yielding the expected output.

(9) ?-Deletion & H-Delinking



## References

Halle, Morris and Kenneth Stevens (1971). A note on laryngeal features. M.I.T. Quarterly Progress Report 101:198-213.

Hyman, Larry (1989). Register tones and toanl geometry, to appear in Keith Snider and Harry van der Hulst (eds) The Representa-tion of Tonal Register, Dordrecht: Foris Publication.

Inkelas, Sharon (1987). Tone feature geometry. In Proceedings of NELS 18. Amherst: University of Massachusetts.

Ladefoged, Peter (1964). A Phonetic Study of West African Languages. Cambridge, Mass.: Cambridge University Press.

----- (1973). The features of the larynx. Journal of Phonetics 1:73-83.

Maran, La Raw (1969). The syllable final in Tibeto-Burman. Unpublished ms. Cambridge, Mass.: Massachusetts Institute of Technology.

----- (1971). Burmese and Jingpo: A Study of Tonal Linguistic Processes. Occasional Papers of the Wolfendon Society on Tibeto-Burman Linguistics 4. Urbana, Ill.: Center for Asian Studies. University of Illinois.

Matisoff, James A. (1970). Glottal dissimilation and the Lahu high-rising tone: a tonogenetic case study. Journal of the American Oriental Society 90:13-44.

----- (1973). Tonogenesis in Southeast Asia. In Hyman (ed). Consonant Types and Tone, 71-96.

Odden, David A. (1988). Floating tones and contour tones in Kenyang Studies in African Linguistics, vol 19:1, 1-34.

Ohala, John J. (1973). The physiology of tone. In Hyman (ed). Consonant Types and Tone, pp 1-15.

Pulleyblank, Douglas and Diana Archangeli (1986). Maximal and minimal rules: effects of tier scansion. NELS 17.

Yip, Moira (1988). Tone contours as melodic units: tonal affricates. In Proceedings of WCCFL 7. Stanford University. 347-362.

ESCOL '90 16-27

# EVENT REFERENCE AND PROPERTY THEORY*

Samuel Bayer
The MITRE Corporation

## 1. Introduction

This paper addresses the general issue of determining the semantic type of a VP complement such as that in example (1):

(1) John wants to swim across the Charles.

Chierchia [6] concludes that the VP complement is interpreted not as a proposition but as a functional object Chierchia calls a ***property***. However, in two recent papers, Dalrymple ***et al.*** [7,8] (hereafter DPS) argue that the shallow anaphora involved in elliptical constructions such as VP ellipsis involves anaphoric reference to descriptions which are propositional, rather than functional, objects.

In this paper, I will apply similar arguments to deep event anaphors such as "do it", arguing that the targets of these anaphors are also propositional objects. I will propose a DRS version of the mechanism proposed by DPS and alluded to by Schuster [19] which resolves the conflicts between the anaphoric target and the environment of the anaphor. I will show that the existence of this mechanism undercuts some of the motivations which Chierchia provides for property theory.

## 2. Background: Syntactic and Semantic Properties

According to Hankamer and Sag [12], Bresnan [3] assumes that "do it" anaphora is a special case of sentential "it" anaphora. In this section I will provide some arguments supporting that assumption.

Among the senses of "do" is one where it is a light verb in the sense of Cattell [5]. Like "perform", "make", etc., "do" takes a direct object which describes an event; the light verb merely relates a participant to the event described in its complement. This complement behaves like any other direct object; it can be passivized and subsequently raised, for instance:

(2a) John did a comparison of the two theories.
(2b) A comparison of the two theories has never been done.
(2c) A comparison of the two theories needs to be done.

In the "do it" construction, the pronoun "it" appears in the direct object position; it, too, can be passivized and raised, as well as conjoined with other noun phrases:

(3a) John was asked to take out the garbage.
(3b) He didn't want to do it.
(3c) It needed to be done.
(3d) If he were to do it and everything else he was asked to do, he wouldn't have time to study.

These parallels between "it" and normal NPs show that the "do it" construction is transparently compositional in the syntax. We will return to the issue of its semantic type in Section 7.

## 3. Dalrymple *et al.* and "It" Event Reference

DPS examine the phenomenon of ellipsis, concentrating on the nature of both strict and sloppy readings. DPS use VP ellipsis as a concrete example of the phenomenon. The following example demonstrates the problem:

(4) Dan likes his wife, and George does too.

This example has two relevant readings, one where George likes his own wife, and one where George likes Dan's wife. DPS point out that most previous analyses of VP ellipsis attribute this ambiguity to an ambiguity in the source clause; that is, the interpretation of the utterance being anaphorically referred to can take any one of a number of forms, and the interpretation of the elided VP depends on which form the interpretation of the source clause takes. The component of the elided VP is taken to be identical to one of the constituents of the interpretation of the source. DPS refer to this analysis as an *identity-of-relations* analysis. DPS reject this position; rather, they argue that the ambiguity of the elided VP is the result of what amounts to nondeterminism in the anaphoric reference process.

### 3.1. The solution

The process which DPS propose involves higher-order unification. That is, it involves a variable over predicates which corresponds to the interpretation of the elided part of the sentence. This variable can be solved for by identifying the portions of the source clause which are parallel to portions of the target clause (subjects in the simplest case of VP ellipsis) and treating these elements as the arguments of the predicate variable. The predicate in the source clause in (4) has four solutions:

(5) P(Dan) = likes(Dan, wife-of(Dan))
(6a) $\lambda$ x.likes(Dan, wife-of(Dan))
(6b) $\lambda$ x.likes(Dan, wife-of(x))
(6c) $\lambda$ x.likes(x, wife-of(Dan))
(6d) $\lambda$ x.likes(x, wife-of(x))

The first two solutions are rejected because they fail to abstract what DPS call "primary occurrences", which are typically the subjects in VP ellipsis cases.[1] The remaining two solutions are exactly the strict and sloppy readings ((6c) and (6d), respectively) which are the possible interpretations of the elided VP in (4). Thus, multiple possible values for the function P arise in the process of making an anaphorically accessed utterance compatible with the environment of the anaphor, and it is this ambiguity, rather than any ambiguity in the source clause, which gives rise to the range of possible readings for the anaphor.

### 3.2. The arguments

As we examine the arguments provided by DPS in support of a propositional account of ellipsis, we will see that they can be applied just as successfully to deep event anaphora.[2] DPS present numerous arguments in support of the propositional nature of the antecedent; I will concentrate on two of them.[3]

### 3.2.1. Abstraction of multiple arguments

The identity-of-relations analysis relies on the components of the derivation of the source clause for its antecedents, and thus can only tolerate one possible abstraction of arguments. Such an analysis cannot handle cases where multiple references to the same source clause abstract different arguments, as in (7a):

(7a) John finished reading the poem before Bill did, and the short story too.
(7b) (=) John finished reading the poem before Bill finished reading the poem, and John finished reading the short story too.

In this example, both ellipses refer back to the first clause. However, the first ellipsis abstracts the subject, and the second the object. In other words, ***both*** of the following derivations of the first clause in (7a) are required:

(8a) [λ x.finish-reading(x, the-poem)](John)
(8b) [λ x.finish-reading(John, x)](the-poem)

Under an identity-of-relations analysis, where only one derivation is available for any given analysis, this situation is impossible, and the relevant reading for (7a) is not available. The same argument can be made for "it" anaphora:

(9a) John insulted Mary before Bill did it, but after it happened to me.
(9b) (=) John insulted Mary before Bill insulted Mary, but after John insulted me.

As in example (7a), the identity-of-relations analysis imposes contradictory requirements on the interpretation of the first clause, due to the abstractions required to yield the proper interpretations.

### 3.2.2. Cascaded ellipsis

Similarly, the identity-of-relations analysis does not tolerate conflicts between sloppy and strict readings. These ambiguities arise in examples of "cascaded ellipsis," where each of a sequence of elided VPs depends on the previous clause, as in (10):

(10a) John realizes that he is a fool, but Bill does not, even though his wife does.
(10b) (=) John realizes that John is a fool, but Bill does not realize that Bill is a fool, even though Bill's wife realizes that Bill is a fool.

On the intended reading, the interpretation of the elided VP in the second conjunct depends on the interpretation of the first conjunct, and the interpretation of the elided VP in the third conjunct depends on the interpretation of the second. Crucially, the second conjunct requires a sloppy reading of its antecedent, while the third conjunct requires a strict reading. Under an identity-of-relations analysis, the sloppy interpretation of the second conjunct means that the interpretation of the first two conjuncts is:

(11a) [λ x.realize(x, x is a fool)](John)
(11b) [λ x.realize(x, x is a fool)](Bill)

On the other hand, the strict interpretation of the third conjunct means that interpretation of the last two conjuncts must be:

(12a) [λ x.realize(x, Bill is a fool)](Bill)
(12b) [λ x.realize(x, Bill is a fool)](Bill's wife)

But these two readings impose contradictory requirements on the derivation of the second conjunct. If it contains a constituent which induces a sloppy reading, it will not be possible to obtain a strict reading of the third conjunct; on the other hand, if it contains a constituent which induces a strict reading, it must be a strict reading with respect to the first conjunct. In other words, under an identity-of relations analysis, the reading in (10) is impossible. The approach that DPS propose, on the other hand, allows a straightforward account of such readings; in each case, the entity which serves as the antecedent is the clause itself, and the anaphoric reference process itself permits the relevant combinations of sloppy and strict readings.

The same problem can be constructed for "it" event reference:

(13a) Bill donated a kidney to his son, but Frank was afraid to do it, so Frank's brother did it instead.

(13b) (=) Bill donated a kidney to Bill's son, but Frank was afraid to donate a kidney to Frank's son, so Frank's brother donated a kidney to Frank's son instead.

The interpretation of the second conjunct must contain a sloppy VP reading so that it can be properly related to the first conjunct, but a strict VP reading so that it can be properly related to the final conjunct. Thus, the intended reading for (13a) cannot be generated under the identity-of-relations analysis.

## 4. Additional Evidence for the Propositional Analysis

In addition to documenting the contradictions discussed in Section 3.2, DPS argue that the identity-of-relations analysis leads to wild ambiguity in the derivation of the source clause. The phenomenon of "it" event reference provides a different set of arguments for the same conclusion.

"Do it" anaphora provides a much wider range of substitutibility of arguments than does VP ellipsis. Furthermore, because it is not coupled to the linguistic form of the anaphor, it permits permutations of surface argument order, which further multiply the range of possibilities. For example, consider (14):

(14) When Sylvia found out how happy Philip was to be tickled, she couldn't resist doing it herself.

The reading of the consequent where Sylvia tickles Philip requires the derivation of the "when" clause to include a VP-type meaning which consists of Philip's being tickled. But no such constituent is built in a monostratal approach to passive.[4]

As another example, consider the following:

(15) John gets punished when he hits the dog, but his parents never say anything when his sister does it to the cat.

The context of the pronoun "it" in this case requires the pronoun to find a two-place function in the derivation of the clause "he hits the dog". This constituent exists (it is the meaning of the verb "hit"), but observe what has happened to the selectional restrictions on the object of "do": that position is now restricted to be a two-place function rather than a one-place function. Only in this situation can the addition of an argument affect the semantic type of other arguments. Consider the selectional restrictions on the verb "promise", for instance:

(16a) John promised that he would leave.
(16b) John promised to leave.
(16c) John promised Mary to leave.
(16d) John promised Mary that he would leave.

The introduction of the NP object does not affect the range of semantic types which can fill the second complement position. The behavior of "do", then, is quite odd.

This behavior is not restricted to "do it"; other instances of sentential "it" anaphora with light verbs also behave oddly. Consider the verb "happen":

(17) A delivery truck hit John in the parking lot. It happened too quickly for anyone to notice the license number. The next day it happened to somebody else.

The second clause illustrates the use of "happen" with an "it" subject which has a propositional referent; the third clause illustrates the use of "happen" with a "to" complement. Under an identity-of-relations approach, the "it" must refer to a functional, rather than a propositional, referent. Just as with "do", the introduction of a "to" complement affects the semantic type of the event argument of the predicate. Furthermore, the constituent which "it" must refer to does not correspond to any constituent in the normal derivation of the first clause; rather, the derivation must be:

(18) $[\lambda x.\text{hit}(\text{delivery-truck}, x)](\text{John})$

Finally, we can construct cases which are parallel to some of the examples of DPS. In (19), the sloppy reading for the VP anaphor must be a function on not only the subject but also subcomponents of the subject:

(19a) The person who introduced Mary to John would not give her his phone number, but the person who introduced Sue to Bill did it gladly.
(19b) (=) The person who introduced Mary to John would not give Mary John's phone number, but the person who introduced Sue to Bill gave Sue Bill's phone number gladly.[5]

As in the case of VP ellipsis, the derivation which would yield a suitable constituent for anaphora under the identity-of-relations approach requires considerable ambiguity of derivation of the source clause, and corresponds to no syntactic constituent.

## 5. Previous Accounts

### 5.1. Schuster

Schuster [19] provides what is intended to be a computational account of event reference. She assumes a fairly standard discourse model (see [20], for example), and proposes to extend this model to handle event reference in situations where the anaphoric pronoun does not refer to one of the discourse individuals in the model.

Entries in Schuster's discourse model for events have two components: the referent of the description (the actual event in question), and a description of the event. So the entry in the discourse model for the utterance "John was hit by a car last night" is

(20) $E_1$: $\lambda e. \exists x\, [car(x) \wedge hit(x, John, e) \wedge during(e, night)]$[6]

When an anaphoric element is encountered which might refer to this discourse entry, the event object itself is first checked for acceptability. If it is not acceptable, an operation Schuster calls ***generalization*** applies. This operation drops clauses from the event type representation to create more general event types and chooses among them for the anaphoric target in question. This generalization mechanism is intended to identify the event referent in (21):

(21) John was hit by a car last night. It happens all the time in our neighborhood.

However, Schuster acknowledges that the mechanism needed for "do it" anaphora will be more complex, since what is involved in examples such as (14) is not generalization but actual conflict between the role fillers in the anaphor and the role fillers in the context of the anaphor. Schuster proposes that in this case the information provided in the second sentence overwrites the information in the first sentence. However, she provides no mechanism to accomplish this.

### 5.2. Klein

Klein [14] focuses on examples like (22):

(22) Lee loves his cat. Gerry does too.

Klein argues that if we introduce a discourse marker for the elided VP, it must refer to a subDRS which represents the property described by the antecedent VP. He notes that this mechanism has already been proposed by Kamp, and adopts Kamp's convention that the subDRS in question have a distinguished discourse marker which stands in for the individual to which the predicate subDRS will be applied. This subDRS, in addition to having this distinguished individual, contains two alternative, mutually exclusive ways to link discourse markers in the VP with the subject. The subDRS for the VP in the first clause of (22), then, would contain two disjunctive clauses, one linking the discourse marker for "his" with the discourse marker for "Lee" (the strict reading) and one linking the discourse marker for "his" with the distinguished discourse marker corresponding to the external subject of the VP DRS (the sloppy reading). Klein provides a semantics for these predicate DRSs and explores their interaction with quantification.

The most obvious problem with Klein's account is that it is simply the DRS encoding of the identity-of-relations analysis. Like the identity-of-relations analysis, it assumes that the type of the antecedent must be a property; furthermore, it locates the ambiguity between sloppy and strict readings in the form of the interpretation of the source clause (via the mutually exclusive options in the subDRS for the VP).

### 5.3. Bäuerle

The closest account to the one I am about to present is that of Bäuerle [2]. Bäuerle adopts a Davidsonian representation of events as an extension of Discourse Representation Theory (DRT), and develops a DRT account of event reference based on Davidson's event individuals. In conjunction with this account, he provides fairly detailed construction rules for tense and adverbials. In order to handle examples like (14), where properties of the anaphoric target conflict with the context of the anaphor, Bäuerle adopts an account very much like Schuster's generalization mechanism, where event types are derived from the DRS associated with the anaphoric target. These event types are taken to be predicates on event instances, and the anaphoric reference process selects the maximally informative event type derived from the anaphoric target. Two crucial aspects are missing from Bäuerle's account: a motivation for the choice of a DPS-style account over an identity-of-relations account, and an account of the sloppy vs. strict ambiguity.

## 6. A Sketch of a Solution

The accounts of Schuster, Bäuerle and DPS locate the ambiguity in the anaphoric resolution process itself; both analyses require a model of anaphora where, in some cases, the antecedent must be modified before it is accepted as the referent of the anaphor.[7] Schuster describes this operation as an overwrite operation, but provides no details; the account of DPS presents it as a process of deriving a predicate which is to be applied to parallel constituents. The two mechanisms amount to the same thing: participants in the antecedent are removed and replaced by participants provided by the context of the anaphor.

My own version of this mechanism should be viewed as a formalization of the rough idea sketched by Schuster and a variation of the approach of Bäuerle. It goes beyond those accounts in that it addresses the derivation of the sloppy vs. strict ambiguities.

### 6.1. My solution

Following Bäuerle, I will couch my solution in the framework of DRT. I follow Partee [17] in introducing event variables as discourse markers into DRSs, and Hobbs [13] in the notation associating that discourse marker with the description of the event. I preserve Klein's notation for identity of discourse markers, and I use the left arrow to indicate assignment of an individual in the model to a discourse marker.[8] Finally, I depart from Kamp in introducing a discourse marker for each NP, including pronouns.

Example (23) shows the representation of a simple sentence. The discourse marker $x_2$ corresponds to the pronoun "his", and since it is bound to the individual named Lee (on our intended reading), it is identical to the discourse marker $x_0$. Example (24) presents the extension of this DRS due to the processing of the second clause.

| $x_0\ x_1\ x_2\ e_0$ |
|---|
| $x_0$ ← **Lee** |
| hit($x_0$, $x_1$, $e_0$) |
| dog($x_0$) |
| of($x_1$, $x_2$) |
| $x_2$ ← **Lee** |
| $x_0 = x_2$ |
| $e_0$ ← **hit$_1$** |

(23) Lee hit his dog.

| $x_0\ x_1\ x_2\ x_3\ e_0\ e_1$ |
|---|
| $x_0$ ← **Lee** |
| hit($x_0$, $x_1$, $e_0$) |
| dog($x_0$) |
| of($x_1$, $x_2$) |
| $x_2$ ← **Lee** |
| $x_0 = x_2$ |
| $e_0$ ← **hit$_1$** |
| $x_3$ ← **Bill** |
| do($x_3$, $e_1$) |

(24) Lee hit his dog. Bill did it too.

What is the antecedent of $e_1$, the discourse marker corresponding to "it"? We do not yet have enough information to determine if $e_0$ is appropriate. What is missing is a statement of the relationship between the various arguments of "do". In the DPS account, their determination of "primary occurrences" (see Section 3.1) identified which semantic arguments in the source clause were liable for exclusion in the derivation of an interpretation for the target clause. Much of the information which guides this determination is syntactic (but see footnote 1). However, in the case of "do", no syntactic information is involved. Instead, the information which guides the determination takes the form of meaning postulates, which assert the relationship between the first and second arguments of the interpretation of "do".[9] The intent of these meaning postulates is that the individual filling the first argument is approximately the agent of the event filling the second argument.[10] I fully expect that this meaning postulate can be stated generally for all events which match the selectional restrictions of "do", but for now I will only state the meaning postulate for "hit":

(25) $\forall x \forall y \forall z \forall e\, [\mathrm{do}(x, e) \wedge \mathrm{hit}(y, z, e) \rightarrow x = y]$

Since the potential antecedent under consideration is a "hit" event, we know that in order for this meaning postulate to hold, the discourse marker $x_0$ must be identical to the discourse marker $x_3$. But this is impossible, since $x_0$ is bound to the individual named Lee and $x_3$ is bound to the individual named Bill. Therefore, the individual event in the model bound to $e_0$ is not eligible to be assigned to $e_1$.

At this point, we must invoke a new mechanism. The event itself is not eligible as the antecedent; therefore, we attempt to import the *description* of the event into the DRS and embed it again. This mechanism amounts to repeating the description in its entirety, and thus we introduce a new set of discourse markers as well. Finally, we introduce the requirements of the meaning postulate in (25) for convenience. The result of this process is shown in example (26).

| $x_0$ $x_1$ $x_2$ $x_3$ $e_0$ $e_1$ | $x_4$ $x_5$ $x_6$ |
|---|---|
| $x_0 \leftarrow$ **Lee** | (a) $x_4 \leftarrow$ **Lee** |
| hit($x_0$, $x_1$, $e_0$) | hit($x_4$, $x_5$, $e_1$) |
| dog($x_0$) | dog($x_5$) |
| of($x_1$, $x_2$) | of($x_5$, $x_6$) |
| $x_2 \leftarrow$ **Lee** | (b) $x_6 \leftarrow$ **Lee** |
| $x_0 = x_2$ | (c) $x_4 = x_6$ |
| $e_0 \leftarrow$ **hit$_1$** | |
| $x_3 \leftarrow$ **Bill** | |
| do($x_3$, $e_1$) | |
| $x_4 = x_3$ (by (25)) | |

(26) Lee hit his dog. Bill did it too.

Now, as Bäuerle does, we must make our new DRS consistent by dropping imported conditions; we begin by dropping the assignment of $x_4$ to Lee because it conflicts with the assignment of $x_3$ under the meaning postulate.

But the resulting description of $e_1$ is still inconsistent. We know that $x_4$ is identical to $x_3$, and that $x_4$ is identical to $x_6$. But $x_6$ is bound to Lee, and $x_3$ is bound to Bill. In order to resolve this inconsistency, we must drop one more clause. But which one? The obvious candidates are the two clauses labeled (a) and (b); in fact, dropping either one will work. Crucially, though, this indeterminacy reflects precisely the range of readings available. If we drop (a), we obtain the sloppy reading; if we drop (b), we obtain the strict reading.

This strategy for resolving event reference has at least one computational advantage over the approach outlined in DPS. My strategy follows Schuster in considering the event object before considering the description. This ordering reflects the fact that reference to a previous event individual is possible in "do it" environments where there are no conflicts among the participants:

(27) John washed the car, but he did it carelessly.

Resolving the reference of the pronoun "it" in this example does not require importing the description of the antecedent and re-embedding it; rather, the event associated with the antecedent is itself the referent. This behavior is mirrored in VP ellipsis examples such as:

(28) John ate seventeen tacos for dinner, but an hour later he wished he hadn't.

The elided VP in this example refers directly to the event described in the first conjunct, but the DPS analysis derives a predicate from the interpretation of the first conjunct and, presumably, determines the referent of the event in question by embedding the resulting description of the second conjunct into the model. It is left to the context mechanism to ensure that it is the event referred to by the first conjunct (and no other which might meet the new description) that becomes the referent of the second conjunct. Thus the discourse entry for the first conjunct must be anaphorically accessed twice, once to get its description and once to get its referent. The approach advocated here is much more direct: check the referent, and then try the description only if the referent is not acceptable.

## 7. Implications for Property Theory

In his discussion of examples like (1), Chierchia distinguishes between two major positions. The first holds that the complements of Equi verbs are essentially one-place functions; this is the position of early Montague Grammar. The second holds that the complements of Equi verbs are essentially propositional in nature; Chierchia cites Bach and Partee [1] as well as GPSG, LFG, and GB.

Chierchia argues that this second position is incorrect. He argues that the following lines of inference are equally valid:

(29a) Nando likes everybody Nunzio likes.
(29b) Nunzio likes Mimi.
(29c) Therefore, Nando likes Mimi.

(30a) Nando likes everything Ezio likes.
(30b) Ezio likes playing tennis.
(30c) Therefore, Nando likes playing tennis.

Chierchia argues that our account of the semantics of these sentences should support the validity of these inferences, but if (31) is the logical form of (29), then only under the property hypothesis should we expect the consequent to follow in

(30); under the proposition hypothesis, we would expect, all things being equal, that Nando likes Ezio's playing tennis:

(31a) $\forall$ x[like'(x)(nunzio') $\rightarrow$ like'(x)(nando')]
(31b) like'(mimi')(nunzio')
(31c) ($\rightarrow$) like'(mimi')(nando')

But all things are not equal. I have motivated a mechanism for resolving conflicts in descriptions which is exactly the mechanism required to get the propositional hypothesis to work. Under such an account, a theory of control based on syntax or argument structure (rather than semantics) will serve the same purpose as the meaning postulate in (25): no matter what other properties the interpretation of the complement might have, the role corresponding to its subject will be filled by the interpretation of the controller. Just as in the "do it" case, the context of an event description will impose requirements on the participants in that event description. If the resulting description is inconsistent and must be resolved, a new referent will be found; otherwise, the referent of the anaphoric source clause can be used. Many such theories of control had been proposed; all of the frameworks which Chierchia associates with the propositional hypothesis have such an account, as do HPSG and Categorial Grammar. There is therefore no reason that a verb like "like" or "want" cannot take a propositional complement. This conclusion has been reached independently by others who have examined the theory of properties, including Zec [21] and Pollard & Sag [18].

## 8. Conclusion

There is a great deal of recent literature on event-based or relation-based semantics; Parsons [16], the framework of Situation Semantics, the axiomatization of DRS found in Zeevat [22] and Faltz [10], among others. The work of Faltz in particular deserves a brief note. Working with Navajo, he examines the implications of the intuitions of his informants that in Navajo a verb together with its affixes is as good as a complete sentence. With the aim of keeping a very tight syntax/semantics map, he proposes a syntax that has no functional categories; NP arguments are adjunct-like, much along the lines of Bresnan and Mchombo [4]. He proposes that the semantics as well should lack functional categories.

English, on the other hand, is well known to have functional syntactic categories. The account presented here, however, as well as other accounts of relation- and event-based semantics, follow the model for semantics Faltz has in mind for the Navajo case. A tight syntax/semantics map requires, as Faltz implies, different architectures for the semantics of different languages, something I, for one, would wish to avoid; on the other hand, the most straightforward compositional semantics conceiveable relies on that strict syntax/semantics map. The evidence presented in this paper suggests that it is the rigidness of the syntax/semantics map, rather than the consistency of cross-linguistic semantic architecture, which must be relaxed.

## Footnotes

[*] I would like to thank Anthony Davis, Polly Jacobson, Mark Johnson, Marc Vilain, and everyone else who helped me formulate my thoughts on this topic. This work was supported by the Rome Air Development Center under Air Force Contract Number F19268-89-C-0001.

[1] Although DPS cite a number examples where this is not the case, for example their (22) and (48).

[2] Although the DPS account is intended to extend to cases of "do it" anaphora (Dalrymple (p.c.)), DPS do not pursue this avenue.}

[3] All examples are from DPS.

[4] See Dowty [9], for example.

[5] In this example, and in the examples in DPS as well, it is interesting that mixed sloppy/strict readings, such as one where the person who introduced Sue to Bill gave Sue John's phone number, are not possible. I have no explanation for this.

[6] Schuster makes use of Miller and Nadathur's [15] higher-order logic, which incorporates Hobbs' [13] and Davidson's representation of event instances, which increases the arity of each predicate by one.

[7] This position contrasts with Gawron and Peters' [11] hypothesis of anaphora as reuse, which requires that anaphor and antecedent have the same content.

[8] Klein uses predicate-argument notation, Kamp the equals sign.

[9] Of course, if this account is to be extended to handle ellipsis, it will need to consider the same syntactic information that the DPS account does; my point here is that the two constructions can rely on very different sorts of information to resolve these role conflicts.

[10] This characterization is by no means intended to be final; there is an enormous body of recent work on semantic roles which must be taken into account as well.

## References

[1] Emmon Bach and Barbara Partee.. Anaphora and semantic structure. In *CLS 16*, 1980.

[2] Rainer Bäuerle. Aspects of anaphoric reference to events and propositions in German. Manuscript, 1988.

[3] Joan Bresnan. Note on the notion `identity of sense anaphora'. *Linguistic Inquiry*, 2:589-597, 1971.

[4] Joan Bresnan and Sam Mchombo. Topic, pronoun, and agreement in Chicheŵa. *Language*, 63(4):741-782, 1987.

[5] Ray Cattell. *Composite Predicates in English*. Academic Press Australia, North Ryde, New South Wales, 1984.

[6] Gennaro Chierchia. Anaphoric properties of infinitives and gerunds. In *Proceedings of the 3rd WCCFL*, pages 28-39, 1984.

[7] Mary Dalrymple, Stuart Shieber, and Fernando Pereira. Ellipsis and higher-order matching. Presented at the 1989 LSA, 1989.

[8] Mary Dalrymple, Stuart Shieber, and Fernando Pereira. Ellipsis and higher-order unification. Submitted for publication, 1990.

[9] David Dowty. Grammatical relations and Montague Grammar. In Pauline Jacobson and Geoffrey Pullum, editors, *The Nature of Syntactic Representation*, pages 79-130. Reidel Publishing Company, 1982.

[10] Leonard Faltz. Navajo and the syntax/semantics map. Talk presented at Yale University, November 10, 1989.

[11] Mark Gawron and Stanley Peters. Anaphora and quantification in situation semantics. Technical report, Center for the Study of Language and Information, Stanford University, 1990.

[12] Jorge Hankamer and Ivan Sag. Deep and surface anaphora. *Linguistic Inquiry*, 7(3):391-426, 1976.

[13] Jerry Hobbs. Ontological promiscuity. In *Proceedings of the 23d ACL*, pages 61-69, 1985.

[14] Ewan Klein. VP ellipsis in DR theory. In Jeroen Groenendijk *et al.*, editors, *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*, pages 161-188. Foris Publications, Dordrecht, 1987.

[15] Dale Miller and Gopalan Nadathur. Some uses of higher-order logic in computational linguistics. In *Proceedings of the 24th ACL*, pages 247-256, 1986.

[16] Terence Parsons. The progressive in English; events, states and processes. *Linguistics and Philosophy*, 12(2):213-242, 1989.

[17] Barbara Partee. Nominal and temporal anaphora. *Linguistics and Philosophy*, 7:243-286, 1984.

[18] Ivan Sag and Carl Pollard. An integrated theory of complement control. Unpublished manuscript, 1989.

[19] Ethel Schuster. Towards a computational model of anaphora in discourse: Reference to events and actions. Technical Report MS-CIS-86-34, University of Pennsylvania Department of Computer and Information Science, 1986.

[20] Bonnie Webber. *A Formal Approach to Discourse Anaphora*. Garland Press, New York, 1979,

[21] Draga Zec. On obligatory control in clausal complements. In Masayo Iida, Stephen Wechsler, and Draga Zec, editors, *Working Papers in Grammatical Theory and Discourse Structure: Interactions of Morphology, Syntax and Discourse*. Center for the Study of Language and Information, Stanford University, 1987.

[22] Henk Zeevat. A compositional approach to discourse representation theory. *Linguistics and Philosophy*, 12(1):95-131, 1989.

ESCOL '90 28-39

# FUNCTION-ARGUMENT STRUCTURE, CATEGORY RAISING AND BRACKETING PARADOXES[1]

Hee-Rahk Chae
The Ohio State University

## I. Introduction

The main topic of this paper is providing a proper analysis of "bracketing paradoxes" in morphology. There has been a lot of literature dealing with this problem (see references below). But none of them seem to be very successful in providing explicit mechanisms for the analysis and in implementing relevant generalizations concerning the data. In this paper, I am going to provide a categorial system, which uses the mechanism of Category Raising in a crucial way. And the relevant generalizations will be implemented into the system with reference to the function-argument structure of the word concerned.

In section II, we will examine two previous approaches to the bracketing paradox problem, which use special operations. But we have some counterexamples to both of these approaches. In section III, we will provide a categorial approach, which elaborates Kang's (1988a, 1988b) approach. In section IV, we will see how the system developed in section III can be used in accounting for bracketing paradoxes in compounds.

## II. Bracketing Paradoxes and Special Operations

As is well known, the following set of words shows bracketing paradoxes in the sense that they require two different bracketings, one for semantics and one for phonology (cf. Pesetsky 1985):

(1) a. un-happy-er ([[un-happy]-er] and [un-[happy-er]])
b. un-grammatical-ity ([[un-grammatical]-ity] and [un-[grammatical-ity]])

The meaning of (1a), which is 'more unhappy' rather than 'not happier', requires the first bracketing in the parentheses. But the phonological fact that the comparative affix *-er* attaches to monosyllabic adjectives and a limited class of disyllabic adjectives requires the second bracketing. Likewise, in (1b), the meaning of the whole word and the behavior of prefix *un-* forces us to have the first bracketing. But the Level Ordering Hypothesis of Lexical Phonology makes us posit the second bracketing because *-ity* is a Level I affix and _un-_ is a Level II affix.

---

[1] This is an abridged version of my original paper under the same title. If you have any questions about the more obscure sections, you may contact me at [hchae@magnus.ircc.ohio-state.edu]. I am grateful to David Dowty and Arnold Zwicky for their invaluable comments on previous versions of this paper. Comments from the following people on various occasions were also very helpful: Jack Hoeksema (1989 LSA Summer Institute), Pauline Jacobson (Spring 1990 at OSU), Mark Libucha, and Mark Steedman (ESCOL '90 Meeting).

There are many different approaches proposed to handle the problem. In this section we will examine Hoeksema's (1985) "head-affixation" approach and Hammond's (1989) "peripheral-affixation" approach. Hoeksema (1985), under the traditional definition of the notion of head as follows (p. 57),

(2) In a construction consisting of a functor F and an argument A, the head constituent is F, unless it is endotypic (i.e. F is of the form X/X or X\X), in which case A is the head.

proposes head-affixation (a type of head operation) (p. 50):

(3) F is a head operation iff $F(Y) = Z$, and $W = XY$ (where Y is the head of W) together imply that $F(W) = X+F(Y) = X+Z$.

The head-affixation can account for, among others, such bracketing paradoxes as in (1), under the assumption that _unhappier_ and _ungrammaticality_ are derived from _unhappy_ and _ungrammatical_, respectively, and under the assumption that the _-er_ attachment and the _-ity_ attachment are sensitive to the heads of these base constructs (i.e. _happy_ and _grammatical_, respectively). That is, these attachments are assumed to be instances of head-affixation.

But Hammond (1989), noting some counter-examples to the head-affixation, argues that it should be replaced with peripheral-affixation. He refutes "the idea that heads can be the locus of affixation" (p. 5) and proposes that "affixation is possible to peripheral constituents, whether they are heads or not" (p. 7).

Both of the above-mentioned approaches seem to provide an account for the bracketing paradoxes in (1). However, neither of the two approaches can handle such examples where affixation is sensitive to the heads of the base constructs but the heads are separated from the attaching affixes. Let us examine the following data, where suffixes are attached to those words which contain exotypic prefixes:

(4) a. en-danger-ed, en-code-ing, en-dear-ment, en-large-ment, en-title-ment
b. be-friend-ed, be-witch-ed, be-friend-ing, be-witch-ing, be-little-ing, be-little-ment

In (4a) the attachment of the suffix _-ed_, _-ing_ or _-ment_ is sensitive to the category of the prefix _en-_. The head-affixation approach would wrongly predict that these suffixes come inbetween _en-_ and the stem of the word (if the operation is head-suffixation) in each case because _en-_ is the head of the base concerned. The result of the operation would be _*en-ed-danger, *en-ing-code, *en-ment-dear_, etc. On the other hand, the peripheral-affixation approach cannot capture the fact that the attachment of these suffixes is sensitive to the prefix _en-_, not to the base. Notice such ungrammatical expressions as _*danger-ed, *friend-ing, *dear-ment_, etc. These expressions show that the attachments of _-ed, -ing_ and _-ment_ are not sensitive to the peripheral elements. Hence, we can say that a peripheral-affixation cannot handle the relevant data, either. The data in (4b) present the same kind of problem to these approaches.

Then, let us consider how the two approaches handle the bracketing paradoxes in *unhappier* and *ungrammaticality* (cf. (1)). The problem here is solved with reference to the fact that the attachment of *-er* or *-ity* is an instance of a special operation. In a sense, the "special behavior" of these suffixes, which is represented as a special mode of combination, is assumed to be related to the paradoxical characteristics of the words. This implies that the bracketing paradox is caused by the suffixes *-er* and *-ity*. However, as we can see in section III, the paradox has nothing to do with these suffixes. On the contrary, it is triggered by the prefix *-un* in these words. This shows that the analyses provided by the two approaches are not correct. Based on the above arguments, we can conclude that affixation cannot be accounted for either by head-affixation or by peripheral-affixation, at least in English.

## III. Function-Argument Structure and Category Raising

To account for affixation in those examples in section II and others, I will provide a categorial approach, under which the order of morpheme combination in a complex word is automatically determined by the categorial specifications of the morphemes in the word. We will not need assume a special (head/peripheral) operation for affixation. Kang (1988a, 1988b) proposes such an approach, independently of the problems of the previously-observed approaches. His system deals with a general issue of "functional inheritance", which refers to those cases where the relationship between functors and arguments is postponed in linguistic constructions. He employs a Category Raising mechanism to handle bracketing paradoxes in morphology. This mechanism in connection with Functional Composition rules provides a powerful categorial system.

We will use the following rules and notational systems in this paper, following Steedman (1987):

(5) Functional Application (FA)
a. $X/Y :f \quad Y :y \Rightarrow X :f(y)$ b. $Y :y \quad X\backslash Y :f \Rightarrow X :f(y)$
(6) Functional Composition (FC)[2]

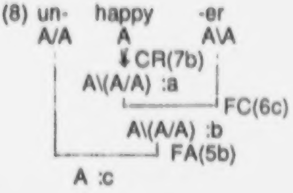
---

[2] If we allow all of the four FC rules, we will face the problem of overgeneration, as was pointed out by Mark Steedman (personal communication). But we need the disharmonic rules ((b) and (d)) to analyze those cases where one of the morphemes in a word passes on its subcategorization requirement to the whole word as in *willing-ness (to go)* and *rebel-ion (against NP)*. A'/VP' N'\A' VP'
There would be three possible ways of handling the problem here. First, we can say that the subcategorization relation between a word and its derivative cannot or, at least, need not be captured in morphology because there are many derivative words which do not have the same subcategorization requirement as their bases. In this case, we need not use the disharmonic FC rules. Second, we can restrict the use of disharmonic FC rules in such a way that they can be used only when sucategorization requirements are involved in the analysis of a word. Third, we can assign special categories for the morphemes involved in the inheritance of subcategorization

a. $X/Y : f \quad Y/Z : g \Rightarrow X/Z : \lambda x[f(g(x))]$
b. $X/Y : f \quad Y\backslash Z : g \Rightarrow X\backslash Z : \lambda x[f(g(x))]$
c. $Y\backslash Z : g \quad X\backslash Y : f \Rightarrow X\backslash Z : \lambda x[f(g(x))]$
d. $Y/Z : g \quad X\backslash Y : f \Rightarrow X/Z : \lambda x[f(g(x))]$

(7) Category Raising (CR)
a. $X : f \Rightarrow Y/(Y\backslash X) : \lambda F F(f)$ b. $X : f \Rightarrow Y\backslash(Y/X) : \lambda F F(f)$

Under the present framework, we can provide a suitable analysis for the bracketing paradox examples. Let us look at the case of *unhappier* (Kang 1988b: 32):

(8)


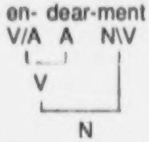
a. $\lambda F[F(happy')]$

b. $\lambda x[er'(\lambda F[F(happy')](x))]$
$= \lambda x[er'(x(happy'))]$

c. $\lambda x[er'(x(happy'))](un')$
$= er'(un'(happy'))$

We can account for the correct formal properties (the fact that *happy* combines with *-er* first) and semantics (er'(un'(happy'))) without violating the principle of compositionality due to the role of the FC rule. Therefore, there is no longer a paradox. We can give the same analysis for *ungrammaticality*.

The sensitivity of the *-ment* attachment to *en-* in the following example (cf. (4)), which is problematic for head- and peripheral-affixations, can be captured by way of the function-argument (F-A) structure of the word:

(9)


The fact that *en-* is the functor in *endear* naturally accounts for the sensitivity relation and the correct bracketing between morphemes. Thus, we need not employ any special operations like head-affixation or peripheral-affixation for concatenation in morphology.

But the system here is too powerful. There are some cases of overgeneration. For example, the present system licenses **analyze-ity-able* as well as *analyze-able-ity*. To restrict the power of the system, Kang (1988b: 54) allows only a specific kind of CR:

---

requirements (a suggestion made by Mark Steedman):
e.g. *willing-ness* *(to go).*
A'/VP' (N'/VP')\(A'/VP') VP'
But we need to assign multiple categories to *-ness* (cf. *fond-ness (of dogs))* under this approach.

(10) Category Raising in (English) Morphology

$$X \Rightarrow X\backslash(X/X) \quad \text{or} \quad X \Rightarrow X/(X\backslash X)$$

The basic idea here is that only the argument of a modifier functor can undergo CR.

I agree with Kang's (1988a, 1988b) basic ideas that we need CR and FC in morphology and the application of CR should be limited in some way. But there are some important issues that are simply assumed or neglected in his analysis. For some of these issues I have ideas different from those implemented in his system. Let us consider these issues one by one[3].

Notice that we can get the desired analyses for dealing with bracketing paradoxes in *unhappier* and *ungrammaticality* only when the second morpheme and the third morpheme combine first, and when CR applies to the second morpheme (cf. (8)). But in Kang's approach, it is simply assumed that the former condition holds (i.e. the second and third morphemes combine first). That is, he assumes a specific F-A structure (i.e. [X/X-[X-Y\X]]) in analyzing these words[4]. Even though the categorial specifications of the morphemes in a word usually determine a unique F-A structure for the word, it is not always the case. Here in the examples of bracketing paradoxes, the first morpheme and the second morpheme can also be combined first, which results in another F-A structure [[X/X-X]-Y\X]. There is no reason why this F-A structure should be disregarded. However, this structure would not give the desired analyses for dealing with the given data. Therefore, we need an explicit mechanism, by way of which it naturally follows that the second and third morphemes combine first.

As for the application of CR, Kang assumes that it applies optionally and the unwanted meaning of the non-Category-Raised version is filtered out by the unacceptability of the meaning itself. For example, in *un-happy-er*, if we do not apply CR to *happy*, and combine *happy* and *-er* first, then we get the meaning un'(er'(happy')). This meaning is unacceptable because *un-* does not properly apply to a comparative adjectival property in terms of semantics (Kang 1988b: 33). This kind of semantic analysis seems to work for *un-*

---

[3] Though not being directly relevant to this paper, one important issue on which I do not agree with Kang's (1988a, 1988b) approach concerns the relation between morphology and syntax. He assumes that morphology and syntax are subject to the same general principles. But morphological facts and syntactics facts are not the same (Zwicky 1989: 16-21). Especially, the organization of morphemes within words and the organization of words within phrases are not the same.

[4] In Kang's approach it is not specified exactly when a particular F-A structure should be assumed among possible F-A structures. The issue is whether selecting a particular F-A structure is necessary only for bracketing paradox cases or for all those words where there is more than one possible F-A structure. I do not think we can assume a particular F-A structure only for the bracketing paradox cases because we do not know beforehand whether they involve paradoxes or not, at least in his approach.

*happy-er* and some others[5]. But semantic constraints are not enough in accounting for all the non-occurring meanings of words caused by the optional application of CR. As we will see later in (18), *county geologist* does not have the meaning of ist'(county'(geology')) 'a scholar of county geology'. But this fact cannot be ascribed to semantic facts. Here what seems to be relevant is that *county* is not an actual element allowed to be compounded with *geology* because *county geology* is not a word listed in the lexicon (cf. Spencer 1988; constraint (12)). Thus, we need to refer to the functor of the category to be Category-Raised and/or these two elements as a unit. Kang (1988b: 34) also says that CR should be limited to the case of "modifiers". But what is represented in his formulation on the restriction of CR, i.e. (10), does not capture this fact. In (10) a (argument) category undergoes CR without reference to its modifier (functor).

Summarizing the problems in Kang's (1988a, 1988b) approach, the environment for the application of CR is not restricted properly. And the order of morpheme combination (i.e. the F-A structure) is not determined purely by the categorial specifications of the morphemes concerned. An unmotivated assumption is involved in selecting the FA structure. To solve these problems we need to formally implement the idea that the (obligatory) trigger of CR is the modifier functor of the argument to be Category-Raised. Based on these observations, I propose to restrict the application of CR as follows:

$$\begin{tikzcd} (11)\ \{X/X\ -\ X\}\ -\ Y\backslash X \arrow[d, Rightarrow] & Y/X\ -\ \{X\ -\ X\backslash X\} \arrow[d, Rightarrow] \\ X\backslash(X/X) & X/(X\backslash X) \end{tikzcd}$$

The (curly) bracketing here does not mean that the whole word is derived from the bracketed construct. It simply indicates one of the two possible analyses of the strings concerned according to the categories of their morphemes. Therefore, CR does not apply when {X - Y\X} or {Y/X - X} is analyzed first. In this paper, we will focus only on the first format, which involves pre-modifiers and suffixes, because the basic principles behind these two formats are the same[6]. With this mechanism we have opened the possibilities of referring to the modifier X/X and other constructs involved (i.e. [X/X - X] and [X - Y\X]). As we will see later, we need to refer to these constructs in accounting for the examples of bracketing paradoxes.

---

[5] We may be able to account for the non-ambiguity of *nonhappier* in the same spirit. This has the meaning of non'(er'(happy')) (Spencer 1988: 669). But when we apply CR to *happy*, we get a wrong meaning er'(non'(happy')). The unacceptability of this meaning may be attributed to the semantic fact that *-er* cannot be applied to the meaning non'(happy') 'it is not the case that happy', and/or that the meaning non'(happy') is not an actual word meaning because *nonhappy* is not a lexical item in English (cf. (12)).

[6] I am not sure whether we need the second format or not in English. We would need this format only if there are cases of bracketing paradoxes which involve prefixes and post-modifiers. Such examples as *pre-attorney-general (period)* might be relevant. N/N N
N\N

Format (11) says that CR obligatorily applies in a specific environment. The category X/X implements the idea that only modifiers trigger CR, and Y\X indicates that CR is effective (or has its meaning) only when all the three morphemes are involved. Hence, CR does not apply to *un-happy* even though it does not affect the meaning. When we consider psychological processes involved in the interpretation of this word, it seems to be more reasonable assuming that CR does not apply at all rather than assuming that it applies vacuously.

However, notice that the format in (11) is not a sufficient condition for triggering CR. Not all the cases of [{X/X - X} - Y\X] trigger CR on X. If we apply CR in *non-happy-er* and *county-geology-ist*, we would get incorrect meanings er'(non'(happy')) (cf. footnote 5) and ist'(county'(geology')). But we cannot say that *non-* itself has the characteristics of preventing CR because it triggers CR in *non-fiction-al* ('of nonfiction' or al'(non'(fiction'))) (cf. (13d)). And we have no a priori (semantic) reason that ist'(county'(geology')) cannot be a meaning of *county geologist*. To solve this problem I propose the following auxiliary constraint:

(12) The (complex) morpheme {X/X - X} in (11) should exist in the lexicon as a separate lexical item.

This constraint is an extended version of Spencer's (1988: 675) "Lexicalization Requirement", which says that "paradoxes can only be formed from members of the permanent lexicon". His original version was posited for the account of "personal noun" paradoxes as we can see in *transformational grammarian, atomic scientist*, etc. This kind of constraint cannot be implemented with Kang's format (10).

Constraint (12) can be regarded as a filter imposed by the lexicon to check the validity of CR triggered by (11). According to this constraint, we can say that *happy* in *non-happy-er* and *geology* in *county-geology-ist* does not undergo CR because *nonhappy* and *county geology* are not existing words in English.

Thus far, we have posited two constraints for the application of CR: a formal restriction (format (11)) and a lexical restriction (12). Now let us consider how we can ensure that the Category-Raised element (X\(X/X)) in (11) combines with the third element (Y\X) first rather than with the first element (X/X). The account here is based on the obligatoriness of the CR. For example, *happy* in *un-happy-er* obligatorily undergoes CR as far as *{un-happy}-er* is concerned because it meets all the conditions. Then, the categorial specification of this word becomes [A/A - A\(A/A) - A\A]. Still *happy* could combine with either of the two elements if nothing forces us to choose one analysis over the other. However, the fact that *happy* and *-er* combine first follows from a general principle here. If *un-* and *happy* combine first, the effect of CR would be null. When a special mechanism is invoked in the analysis of a linguistic expression, it should have some effect on the analysis. If the mechanism does not have any influence, it would not be invoked from the beginning. Due to this independently motivated principle, the Category-Raised *happy* combines only with *-er* with a FC rule. Here we can notice that the behavior of the Category-Raised element (X\(X/X)) is also restricted in its behavior. It can only be Function-Composed with Y\X.

We have restricted the behavior of CR with reference to its triggering environment. We have also restricted the behavior of the category which has undergone CR with reference to a general principle. Only the argument of a X/X functor undergoes CR and then the raised category feeds the FC rules. With these restrictions, we can solve the problems which were raised in the framework of Kang (1988a, 1988b). Let us examine the following analyses:

| (13) {X/X - X} - Y\X | X/X - {X - Y\X} |
|---|---|
| a. un- happy -er<br>A/A A\(A/A) A\A<br>A\(A/A)<br>A<br>er'(un'(happy')) | un- happy-er<br>A/A A A\A<br>A<br>A<br>*un'(er'(happy')) |
| b. un- grammatical-ity<br>A/A A\(A/A) N\A<br>ity'(un'(grammatical')) | un- grammatical-ity<br>A/A A N\A<br>N<br>* |
| c. non-happy -er[7]<br>A/A *A\(A/A) A\A | non-happy-er<br>A/A A A\A<br>non'(er'(happy')) |
| d. non-fiction -al<br>N/N N\(N/N) A\N<br>al'(non'(fiction')) | non-fiction-al<br>N/N N A\N<br>non'(al'(fiction')) |

All the analyses considered in the left-hand column meet the requirements imposed by condition (11). But *non-happy-er* in (13c) does not undergo CR because it is constrained by condition (12). In (13a), we can provide both of the two possible analyses. But the meaning derived from the second analysis is unacceptable, as we have seen above, due to the semantic characteristics of *un-*. In (b), the second analysis is ruled out by the impossible F-A structure. In (d), both of the analyses give legitimate results. Therefore, the word is ambiguous between 'of nonfiction' and 'not fictional'.

---

[7] Even though *happy* in *non-happy-er* does not undergo CR, it may still be analyzed as ({A/A - A} - A\A), giving the meaning of er'(non'(happy)). This meaning can be ruled out by semantic reasons as is indicated in footnote 5. But we need to enforce a more general restriction to prevent this analysis because we cannot provide such a semantic account for the ist'(county'(geology')) meaning for *county geologist*. We need to say that constraint (12) prevents all the possible analyses of ({X/X - X} -Y\X) when the complex morpheme [X/X - X] is not an actual lexical item. The difference between er'(non'(happy')) and ist'(county'(geology')) is that the former is an impossible meaning while the latter is a possible but not actually occurring meaning.

## IV. Bracketing Paradoxes and Compounds

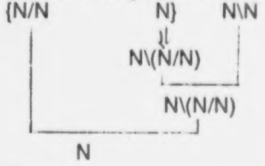
We can see bracketing paradoxes also in compounds of the form in (14a) when they show the "external attachment" pattern of (14b) (Zwicky 1987: 266):

(14) a. [$W_1$ + $W_2$ + S(uffix)]
b. W = $W_{1+2}$ (= $W_1$ + $W_2$) + Suffix
c. W = $W_1$ + $W_{2+S}$ (= $W_2$ + Suffix)

But when the compounds have the "internal attachment" pattern in (14c), they do not show bracketing paradoxes. Because the problem of bracketing paradoxes are handled with reference to CR in our framework, we can infer that only the external attachment pattern invokes CR. In section III, we have seen that CR requires two conditions. The first one is a formal condition of [{X/X - X} - Y\X] (11) and the second one is the condition that the unit [X/X - X] must exist as a separate word in the lexicon (12).

First, let us consider how we can analyze examples of A(djective)+N(oun) compounds of the following:

(15) a. transformational grammar ian[8] (cf. transformational grammar)



b. Chinese history ian (cf. Chinese history)
{N/N N} N\N

From a semantic point of view, the affix *-ian* is attached to the whole compound. But, from a phonological point of view, it is attached to the second element of the compounds[9]. As we can see in (15a), the bracketing paradox can be accounted for under the framework developed in section III.

---

[8] Here we need to explain why *transformational-grammar-ian* is not a
N/N {N N\N}
possible analysis, which gives the meaning transformational'(ian'(grammar')). This may be a possible meaning of the word. But it does not actually occur in the lexicon as a meaning of the word just like the meaning of *county geology* does not.

I will argue that we can use the same mechanisms in dealing with bracketing paradoxes in N+N compounds:

| (16) | juncture | grammar | ian |
|---|---|---|---|
| | N/N | N | N\N |

One might say that it is arbitrary to assign category N/N to *juncture* here. But we have some evidence which shows that the first elements of compounds in (15) and (16) are of the same category (N/N)[10], which is different from normal (modifying) A(djective)s (N'/N) (Zwicky 1987: 270):

(17) a. *adequate and relational grammars
b. relational and juncture grammars

As we can see in (a), A(djective)s in compounds do not cooccur with normal As as conjuncts of coordination. And I think they do not show the inflectional paradigm of normal As, either. But they can cooccur with Ns in the compounds as in (b). These facts show that the analyses in (15-6) are plausible.

There are some compounds which show only the internal attachment pattern of (14c) (Zwicky 1987: 266):

(18) a. county geologist 'geologist for the county'
b. house grammarian 'grammarian for the house'

These expressions do not involve CR because they do not show the external attachment pattern. This can be explained based on the second condition on the applicability of CR (12). They do not undergo CR because *county geology* and *house grammar* do not exist as independent words in the lexicon. As we have seen before, this kind of example constitutes one of the most important pieces of evidence for our condition (12)[11]. No semantic principles can account for the non-existence of *county geology* and *house grammar*.

---

[9] The syntactic properties also require the same bracketing as that for phonology, as is pointed out in Zwicky (1987: 274):

i) a. transformational and stratificational grammarians
b. a generative syntactician or phonologist
ii) She's the Japanese historian, and she's the Chinese (one).

The second word in the compound and the affix function as a syntactic constituent in coordination and anaphora.

[10] For the word-hood of the whole compounds, see Zwicky (1987: 270 and footnote 5 there).

[11] Notice that our auxiliary constraint on the applicability of CR (12) should be weakened somewhat when we take compounds into consideration, as is implied in Spencer's (1988: 675) definition of the "Lexicalization

To account for the ungrammaticality of the following expressions, Spencer (1988: 675) assumes the "Same Lexical Source Requirement", a part of which says that "paradoxes may only be licensed by an instance of precisely the same lexical entry":

(19) *bad grammarian, *white elephantine

The first expression is ungrammatical because the meaning of *grammar* in *bad grammar* ('adherence to socially accepted speech norms') is different from that of *grammar* in *grammarian*. The second expression is ungrammatical when *white elephant* has the meaning of 'a usually big object not useful to its owner'.

However, the problem here does not seem to be particular to bracketing paradoxes:

(20) *bad and transformational grammars

These are ungrammatical (with the compound meanings) due to the same reason as that for the expressions in (19). In **bad grammarian*, *grammar* is a part of *bad grammar* and at the same time a part of *grammarian*. In this sense, the role of *grammar* here is the same as that in (20). In both of these cases, *grammar* is the factor in the complex construct concerned. The factor is licensed only when the lexical item which is required by each of the two base constructs is the same. But it is not the case both in (19) and (20). Then we can say that Spencer's Same Lexical Source Requirement induced to account for data such as those in (19) is not appropriate because this requirement has no intrinsic relation with bracketing paradoxes. The ungrammaticality of the expressions in (19) and (20) comes under the same general principle, say "prohibition against a mixed factor".

## VI. Conclusion

In this paper we have provided a categorial approach for the bracketing paradoxes in words including compounds. Without employing any special operations such as head-affixation or peripheral-affixation, our approach handles the relevant data on the basis of the F-A structure, which is controlled by FA rules, FC rules and CR. But, more importantly, we have provided a set of restrictions on the application of CR, which makes it possible to get a unique analysis of the words showing bracketing paradoxes based on the categorial specifications of the morphemes concerned. Without these restrictions, the mechanism would be too powerful.

---

Requirement", which says that "the source expression (i.e. [X/X - X] part) should be lexicalized or perceived as such":

kind-hearted (cf. *kind-heart), on-looker (cf. *on-look),
by-stander (cf. *by-stand), under-developed (cf. *under-develop).

We have seen that CR is applied in fairly restricted situations in morphology. This seems to be one of the differences between morphology and syntax. In syntax, the application of CR is not so tightly restricted as in morphology (cf. Dowty 1988). This may be due to the fact that the order of morphemes in words are almost fixed but the order of words in phrases is not very fixed even though it is not free.

<References>

Dowty, David (1988) "Type Raising, Functional Composition, and Non-constituent Conjunction," in Richard Oehrle et al. (eds.), *Categorial Grammars and Natural Language Structures*, D. Reidel Publishing Co., 153-197.
Hammond, Michael (1989) "Peripherality and Head Affixation in Morphology," ms., University of Arizona.
Hoeksema, Jack (1985) *Categorial Morphology*, Garland Publishing, Inc.
Kang, Beom-mo (1988a) "Constraining Category Lifting in Categorial Morphology," *ESCOL '87*, 164-175.
____ (1988b) *Functional Inheritance, Anaphora, and Semantic Interpretation in a Generalized Categorial Grammar*, Ph.D. dissertation, Brown University.
Pesetsky, David (1985) "Morphology and Logical Form," *Linguistic Inquiry* 16.2, 193-246.
Spencer, Andrew (1988) "Bracketing Paradoxes and the English Lexicon," *Language* 64.4, 663-682.
Steedman, Mark (1987) 'Combinatory Grammars and Parasitic Gaps," *Natural Language and Linguistic Theory* 5, 403-439.
Zwicky, Arnold (1985) "Heads," *Journal of Linguistics* 21, 1-29.
______ (1987) "*Transformational Grammarians* and Their Ilk," *MIT Working Papers in Linguistics* 9, 265-279.
______ (1989) "Some Choices in the Theory of Morphology," ms., to appear in *Formal Grammar: Theory and Implementation*, S. Davis and R. Levine, eds., University of British Columbia Press.

ESCOL '90 40-54

# AT THE PHONETICS/PHONOLOGY INTERFACE: (RE)SYLLABIFICATION AND ENGLISH STOP ALLOPHONY

Donald G. Churma
SUNY at Buffalo

One of the most intensively investigated phonetic/phonological phenomena is a set of 'low-level' processes found in many varieties of English, the aspiration and glottalization of voiceless stops and the flapping of alveolar stops (cf., for example, Stampe 1973, Kahn 1976, Fujimura and Lovins 1978, Kiparsky 1979, Selkirk 1982a, Withgott 1982, Church 1983, Picard 1984, Kaisse 1985, Borowsky 1986, Gussenhoven 1986, and Jensen 1990). In this paper, I will present data that are problematic for all previously proposed accounts that I have seen. I will argue that the reason for the failure of these accounts is that they are, in effect, overly phonological in nature, in that they (with the partial exception of Stampe and Selkirk) make use of exclusively phonological concepts such as position within a syllable or in prosodic structure. A full account, I will propose, requires reference not only to whether or not a segment is released (as Stampe and Selkirk have already proposed), but also the physical length of the segment in question. Since neither of these features is present in underlying representations (note that the length referred to here – like allophonic vowel length in English (cf. Keating 1988) – is not the same thing as the length found in languages with contrastive length, and so cannot be represented in the same way), the rules that refer to these features are ones of 'phonetic implementation , although they will be fed in some cases by strictly phonological rules such as (re)syllabification.

In the first section below, I will give a brief presentation of the relevant data. I will then turn to a survey of previous accounts of syllabification in (primarily American) English (section 2) and of aspiration, flapping, and glottalization (sections 3, 4, and 5). I will conclude with an alternative account of the phenomena under discussion.

## 1. The data.

The data presented here are based primarily on my own impressionistic transcription of my speech and that of others, although in most cases the same data have been reported by other authors, and in many cases there is instrumental verification. It is not clear that it is in principle possible to use instrumental means to study some aspects of the phenomena in question, in particular aspiration, in view of the fact that the actual amount of aspiration present can vary substantially, depending both on point of articulation and position within the word, as well as factors such as speech rate. In any event, the distinction between aspirated and unaspirated stops is surprisingly clear to me, at least in relatively short phrases, and I have found

---

[0] Earlier versions of this paper were presented at the Winter 1988 meeting of the Niagara Linguistics Society and at the 1990 Toronto Workshop on Phonology. I would like to thank members of the audiences in both cases, as well those who commented on the oral version of this paper, for their valuable questions and comments, especially John Jensen. I would also like to thank Carlos Gussenhoven for a number of discussions of the facts that will be considered here which helped reawaken my interest in this topic.

that I had full confidence in my assessment of the speech of others even when such pronunciations violated my (earlier) rules. I have not found glottalization to be as easy to detect as aspiration, and instrumental studies (perhaps along the lines of the study of (pre)glottalization in British English by Andrésen 1968) could well provide substantial relevant data. As for flapping, a flap can be distinguished from a very short stop on the basis of the very different ballistics of tongue movement. In my own speech, it is possible, at least in casual speech, to find an allophone that is a further step in the weakening of stops, namely an alveolar approximant in which the tongue makes a movement toward the alveolar ridge, but does not make contact with it. In all of the cases where I claim that flapping is possible, I find that a pronunciation with such a 'superflap' is possible.

All analysts agree that flapping occurs when an alveolar stop is between a stressed vowel and an unstressed vowel, and in many cases this is the full account of flapping (cf., for example, Akmajian et al. 1979:95 and Fromkin and Rodman 1988:79). However, as Kahn (1976:57) has pointed out, certain consonants may intervene between the stressed vowel and the stop, in particular /r/, /n/ (only for /t/), and (less readily) /l/.[1] Kahn further notes (31) that the (lack of) stress of surrounding vowels is irrelevant when the stop is word-final: such stops regularly flap (cf. *met Ann, that is*). It is also worth pointing out that unstressed syllabic consonants work just as well as unstressed vowels in conditioning word-medial flapping (cf. *water, bottle, bottom*), except that flapping cannot occur before syllabic /n/. Still another environment in which flapping is possible is before /h/ (Stampe 1973) or pause (Stampe 1973, Selkirk 1982a), as long as the preceding material is appropriate. The flapped /t/s in such cases are voiceless, however, a fact which may account for the more or less general failure to recognize the possibility of flapping in such environments. Prepausal /t/ has other allophones, as well, an unreleased and glottalized version and an aspirated one. The latter allophone appears to be restricted to appearing (at least for me) in hyperarticulate speech styles, such as a response to a surprising and/or shocking statement (*He said WHAT?*), and the flap allophone occurs more readily in casual speech. Flapping also occurs when an unstressed word-final syllable is preceded by an unstressed syllable (cf. *monitor, capital, reduplicative*), and when the consonant is preceded by two unstressed syllables and followed by an unstressed syllabic which in turn is followed by a stressed syllable (cf. *systematization, alphabetization*).[2] Finally, /d/ and /n/ may flap regardless of the stress of surrounding syllables, at least in rapid speech (cf. *productivity, a*

---

[1] The partial blocking power of /l/ is puzzling, at least for speakers who, like the present author, have no alveolar contact during the articulation of such /l/s. Kahn's suggestion that it is possible to flap if there is no alveolar contact, but not if there is such contact, thus cannot be maintained. A further problem for this suggestion is the fact that, for some speakers at least (cf. Selkirk 1982a), unflapped /t/s are aspirated, contrary to the predictions of Kahn's account (see below). Note also that /p/ and /k/ surface as unaspirated in the relevant environments (*Alka (Seltzer), Kolper*), so the possibility of aspiration with /t/ is especially curious.

[2] These words are, of course, not monomorphemic, and since morphologically complex words can behave differently than monomorphemic words (note the flap before a stressed vowel in words like *clitism*). Unfortunately, English does not appear to allow three consecutive unstressed syllables in monomorphemic words. (I would like to thank Bill Poser for unwittingly supplying me with the *systematization* example.)

*name*).[3]

As far as aspiration is concerned, most analysts agree that it occurs word-initially and at the beginning of a stressed syllable. Those who have examined longer words (Withgott 1982, Jensen 1990) point out that it also occurs at the beginning of an unstressed medial syllable which is itself preceded by an unstressed syllable and followed by a stressed syllable (*Mediterranean*, *Tippecanoe*, *abracadabra*). As noted above, if this configuration occurs word-finally, flapping is possible; aspiration, however, is impossible (*America*, *caliper*). In (rare) words with three consecutive unstressed syllables (e.g., *classificatory*), the consonant between the second and third unstressed vowels (here the /k/), appears to be unaspirated (cf. also *alphabetization*, with flapped /t/, as noted above), and when three such syllables occur word-finally (*reduplicative*), my aspiration-deciding abilities are at their limit, but the /k/ appears to be aspirated. (A word with a /t/ in this position would be a better test case, since if it were not aspirated, it would be a flap. Unfortunately, I have not been able to find relevant examples, and my intuitions about how I would pronounce nonce forms (*reduplitative*) are none too firm, but it seems that the (first) /t/ does not flap.) As noted above, aspiration is possible prepausally, at least in careful speech.[4]

Glottalization is not discussed by most authors, but Kahn (1976:49-52) suggests that it is found in the following environments:[5] prepausally when preceded by [–cons] – which includes, for Kahn, /r/ and the allophone of /l/ that lacks alveolar articulation – or an (underlying) nasal (as Kahn points out (50), Malécot 1960 has shown that for most dialects of American English, such nasals are not present phonetically, with heavy nasalization on the preceding vowel being the primary cue for identifying the underlying nasal consonant), and when not syllable initial and followed by [–syl]. Selkirk (1982a:374-5) states the distribution of nonrelease (which correlates exactly for her with glottalization) as follows: it is obligatory after [–cons] and before [–syl],

---

[3] Arnold Zwicky is the unwitting source of the first of these examples.

[4] There apparently is some dialectal variation concerning whether or not the stop in words like *April* is aspirated. I cannot find any explicit statements concerning this issue in Kahn 1976, but his rules predict lack of aspiration, and the syllable structure he assigns (27) to this item would clearly require lack of aspiration. Selkirk, on the other hand (1982a:364) states explicitly that there is aspiration. My judgments concerning my own speech coincide with what appears to be Kahn's position, i.e., there is no aspiration. Gussenhoven claims that his 'own observations suggest that [what he takes to be] Kahn's [dialect] is the more representative here' (135), but it seems further research will be required before any such quantitative claims can be taken seriously. I have observed both pronunciations (in different speakers), however, and I am reasonably convinced that there are genuine dialect differences with respect to this issue. There is at least one further kind of case in which there appears to be dialectal variation, that in which an *s*-stop cluster is flanked by two stressed syllables, as in *Wisconsin* and *Moscow*. In my pronunciation of the former, aspiration appears to be required, and I have observed such a pronunciation in at least one other speaker who grew up in the same region I did. For other speakers, however, it is not present (regardless of whether or not the vowel in the first syllable is stressed).

[5] Kahn actually restricts his discussion to /t/. Furthermore, he suggests that the likelihood of releasing a stop (and lack of release seems to correlate with glottalization – cf. section 5) varies with point of articulation. Since I do not share his intuitions on this point, and since he admittedly (49) has no explanation for this alleged fact, I will extrapolate from his exposition to all voiceless stops.

optional after [−cons] and before pause, optional between two [+cons] segments (but depends heavily on the type of consonant that follows'), and 'possible but definitely not preferred' between [+cons] and [−cons, −syl] or pause. Gussenhoven claims (134) that the environment for glottalization is strictly syllable-final position, and Jensen claims that it is having the stop in a rime and preceded by [−cons]. Obviously, these claims are incompatible with each other, and none corresponds exactly to my own observations (although, as noted above, I do not have full confidence in them), so I will for the most part ignore glottalization. I will, however, add one context in which glottalization clearly occurs – when the stop is followed by a homorganic stop[6] (oral or nasal, syllabic or not) – cf. *button, catnip, pop bottle*. This fact will be seen to be the basis for an argument (cf. section 5) that Selkirk is correct that lack of release is crucial for glottalization. I give a summary of the contexts in which these various processes apply in (1):

(1) a. Flapping: provided that the segmental context is appropriate, between a stressed syllable and an unstressed syllable; word-finally before a vowel, /h/, or pause; between two unstressed syllables (in certain cases); for /d/ and /n/ only, all contexts in rapid speech.
b. Aspiration: word-initially; at the beginning of a stressed syllable; between two unstressed syllables (in certain cases); optionally, prepausally.
c. Glottalization: before a homorganic stop and in other cases that are not totally clear.

## 2. Accounts of syllabification in (American) English.

The earliest accounts (cf. Pulgram 1970 and the references cited there) employ the following principle (sometimes referred to as the 'Maximize Onsets' principle):[7]

(2) Maximize onsets to the extent that no impossible clusters result.

In many later accounts, syllabification is held to be sensitive to the stress or lack thereof of surrounding syllables. For Hoard 1971, all unstressed syllables that are not word-initial must begin with a vowel; otherwise syllabification follows (2). This account requires some extremely counterintuitive syllabifications, with all three medial consonants in *congress*, for example, assigned to the first syllable; I will not consider this proposal further here.

Stampe 1973 has proposed a less radical version of this proposal. Although Stampe's proposal is not fully explicit, it employs the following principle for syllabification (56): it 'attaches a nonsyllabic to the syllable to the right, but if the syllable to its right is unstressed, the nonsyllabic is instead attached to the syllable to its left'. It is also 'subject to various constraints ... involving morphological boundaries and constraints on permissible syllable structure', but these constraints are not spelled out. It appears that what he has in mind concerning the 'constraints on permissible syllable structure' is that syllable-initial sequences must be possible word-initial sequences, and syllable-final sequences must be possible word-final sequences.[8] This is presumably not all there is to it, since *patron* would have the /t/ in the first syllable on this account, whereas it is said (54) to be in the second.

---

[6] For many speakers, it is possible to further weaken the oral stop via loss of the oral closure, with a resultant glottal stop.

[7] Picard 1984 is the most recent defense of this principle that I know of. This defense is not terribly effective; see Churma 1990 for extensive discussion of Picard's (mis)analysis.

Kahn's 1976 account is in some ways an even less radical version of the stress-sensitive proposal, in that only one consonant that (2) would assign to a following syllable may put in the preceding syllable, and then only partially, i.e., it is ambisyllabic (simultaneously in both surrounding syllables); in addition, the preceding syllable must be stressed and must end in a [−consonantal] segment (/r/ would qualify, according to Kahn). Kahn's account requires two further rules of resyllabification, one which ambisyllabifies a syllable-final consonant from a stressed syllable into a following unstressed syllable provided that no 'member of the set of universally-prohibited clusters' (32) results, and one which ambisyllabifies a word-final consonant followed by a vowel-initial word, regardless of the stress on the flanking syllables. It will be seen below that this account has some rather serious drawbacks.

Selkirk's 1982a account is similar to that of Stampe, except that consonants that (2) would put in a following syllable are resyllabifiable only if they are preceded by a stressed syllable and immediately followed by an unstressed syllabic,[9] and resyllabification is not possible if a obstruent-sonorant cluster would result. Resyllabification

---

[8] In an obscure work not cited in any of the other works on syllabification, Fu (1963:138) has proposed something very much like this: 'initial-equivalent clusters are assigned to the subsequent stressed syllable, and final-equivalent clusters to the preceding syllable'. Fu does not treat stop allophony at all, however, and his only justification for his principle (121) is its 'consistency' and 'capability of yielding in the end the most economical description of the syllable structure of the language' – despite the fact that no other possible principles of syllabification are considered. He also claims (119) that 'it doesn't matter which way we divide [words with two consecutive stressed syllables], for the phonemic structure of the two parts will always parallel or equal that of free, meaningful words'. It will turn out to matter a great deal as far as interpreting the allophonic behavior of the phonemes in question is concerned. Fu is also inconsistent with respect to the role of the morphology in syllabification, sometimes locating syllable boundaries at morpheme boundaries or even pseudo-morpheme boundaries, as in *admir-al, bever-age* (139), and sometimes not, as in *America-nize* (156).

[9] As Selkirk points out (369), *s*-stop clusters may be problematic for her approach. Since there is invariably no aspiration in such cases, Selkirk's account of aspiration (cf. section 3) requires that both consonants be in the same syllable. Since resyllabification is inapplicable here, these consonants should both be in the following syllable. However, she notes (370) that Kahn's observation that 'in ordinary speech the syllabic structure of *after* seems entirely parallel to that of *Astor, Haskins*' appears to be accurate, and since both consonants in the former would be in the preceding syllable on her account, then presumably so should the *s*-stop clusters. One way of allowing this to happen (371) is to revise resyllabification so that such clusters (and no others) may be resyllabified at the same time. While this revision appears to work mechanically, it provides no explanation for why *s*-stop clusters behave differently than all others, so one would appear to be driven to the remaining proposal that she suggests (note 40), that such cases be treated as single 'complex segments'. Such clusters do not behave like uncontroversially complex segments such as affricates in, e.g., speech errors (Davidsen-Nielsen 1975) or in the reversed speech of 'fluent backward talkers' (Cowan and Leavitt 1981), however, so this proposal is incompatible with independent evidence, and we appear to left with no explanation of the behavior of the clusters in question.

is obligatory if the preceding segment is [−consonantal], optional otherwise.[10]

Gussenhoven 1986 has proposed what is essentially a cross between Kahn's account and the Stampe/Selkirk approach. He suggests modifying Kahn's leftward ambisyllabification rule so that it may put as many consonants into a preceding syllable (stressed or unstressed) as would produce an acceptable final cluster, with the last of these, and only this one, being ambisyllabic.[11] For one thing, this modification renders Kahn's rightward word-internal ambisyllabification unnecessary,[12] although rightward ambisyllabification of word-final consonants is retained in its original form.

I give in (3) the syllabifications of representative words for each of these proposals. (I am not certain that the syllabification of *congress* that I attribute to Stampe is in fact what he takes it to be. Note also that Kahn (47) 'find[s] aspiration optional, with a preference for unaspirated /k/' (his emphasis) in words like *napkin*, which may indicate variability in the syllabification of this word.)

(3) a. Traditional:
re.strain Ea.ster af.ter nap.kin con.gress A.pril
b. Hoard:
re.strain East.er aft.er napk.in congr.ess Apr.il
c. Stampe:
re.strain East.er aft.er nap.kin con.gress A.pril
d. Kahn:
re.strain Eas̩ter af̩ter nap.kin con.gress Ap̩ril
e. Selkirk:
re.strain East.er aft.er napk.in con.gress A.pril
f. Gussenhoven:
re.strain East̩er aft̩er nap.kin con.gress Ap̩ril

Only one of these proposals can be correct, of course (ignoring the for the moment the possibility that different authors may be describing different dialects), and there is almost no relevant evidence from instrumental studies. The little data available (cf. Fujimura and Lovins 1978, Krakow 1989) suggests that the some version of the total resyllabification approach is correct. Fujimura and Lovins (note 43) point out that the velum 'is very low for a long period in *bunny*, and claim that this is a characteristic of only syllable-final nasals, and Krakow reports that the evidence from her study of interarticulator timing is that the relevant nasals show no characteristics of syllable-initial nasals, but rather exclusively those of nasals in syllable-final position. In the absence of more extensive instrumental evidence, it may well be that the best way of evaluating these alternative proposals is to see how successful they are in making sense out of the data presented above (cf. Anderson 1982 for a similar proposal concerning the evaluation of alternative accounts of syllabification in French).

---

[10] Selkirk claims parenthetically (366) that 'some resyllabifications are less likely than others ...' in that the '*k* of *napkin* may aspirate more readily than the *t* of *Acton*' and that 'the *t* of *filter* is undoubtedly more often aspirated than the *k* of *alchohol*', noting that her account provides no explanation for these differences. The first of these examples does not have an unstressed vowel in my speech, so her account would correctly require aspiration of the *k*. However, aspiration seems to be at least nearly obligatory for me in some cases even when the following syllable is unstressed, as in *Atkinson*, *Lefkowitz*, *Ditka*, although I have caught myself uttering the last of these examples without aspiration. Note that in all of the cases where I find aspiration impossible (cf. note 1), the segment in questions forms part of a possible word-final cluster upon resyllabification, unlike in the cases just cited.

[11] In this respect, this account differs from the one proposed by Anderson and Jones 1974, where all consonants before an unstressed vowel are said to be ambisyllabic. Since these authors do not discuss the phenomena that are the main focus of this paper, I will not discuss their proposal further.

[12] Eliminating this rule is not without its costs, since it forces Gussenhoven to the position that /ŋ/, 'though an impermissible word-initial onset, ... is not an impermissible syllable-initial onset' underlyingly (124), in order to account for Kahn's (and Gussenhoven's and my) perceptions of identical syllable structures for *hammer* and *hangar*.

## 3. Accounts of aspiration in (American) English.

Aspiration is sensitive to one of two things in all of the work I have seen, position in either the syllable or the foot (other than the traditional approach which would apparently be reduced to simply listing disjunctively the environments in (1a) – cf. Churma 1990). I will consider each of these two basic kinds of proposal in turn.

### 3.1. Accounts based on syllable structure.

Insofar as an account of aspiration has been given (Stampe does not discuss aspiration), it is said to occur in syllable-initial position (strictly so – i.e., ambisyllabic consonants are not aspirated – for those who allow for ambisyllabicity).[13] In order for this proposal to work, one has to somehow make sure that the /t/ in *Mediterranean* (and the relevant stops in other examples of this type) is strictly syllable-initial. Since Kahn's leftward ambisyllabification rule requires that the preceding syllable be stressed, such stops will indeed be strictly syllable-initial, and hence appropriately aspirated. On the other hand, it also predicts incorrectly that the /t/ in, e.g., *monitor* will be aspirated. Selkirk's account, again because of the requirement for stress, makes the same predictions. Gussenhoven's account, because it does not require preceding stress for leftward ambisyllabification to take place, predicts that the relevant stops in these kinds of cases will be ambisyllabic, and hence that they will not be aspirated – correctly in *monitor*-type cases, but incorrectly for *Mediterranean*. Finally, all three accounts fail to account for the (optional) aspiration of prepausal stops, so it seems clear that something other than any of these accounts (perhaps different in only minor respects) will be have to be proposed if a syllabification-based approach is to account for all of the aspiration facts.

### 3.2. Accounts based on foot structure.

Kiparsky 1979 is the first foot-based account that I know of. Here the proposal is that aspiration occurs, roughly, in foot-initial position. Later accounts

---

[13] Gussenhoven (1986:125, 133) suggests that this 'strictly syllable-initial' constraint is relaxed in British English, and in this variety even ambisyllabic stops are subject to aspiration. In fact, aspiration can occur in British English, at least in hyperarticulate speech styles, in still other contexts. In particular, word-final voiceless stops may be aspirated even when the following word begins with a consonant.

(Withgott 1982, Church 1983, and Jensen 1990) maintain the foot-initial analysis, although they are forced to set up somewhat unusual-looking feet that begin with an unstressed syllable in order to account for the aspiration in examples like *Mediterranean*,[14] and Withgott must add another context, initial in a stressed syllable (Church may have to, as well, but his account of foot structure is not sufficiently explicit for me to know for certain), since on her account the syllable with primary stress in such cases is not foot-initial (it is foot-initial for Jensen). As long as one is willing to buy the odd feet, this approach does in fact account for the data in question, as well as the failure of aspiration to apply in word-final unstressed syllables that are preceded by an unstressed syllable (since in the latter cases, there is is nothing to the right of the final syllable for it join, and so must be adjoined to the left. It does not, however, account for the cases with three consecutive medial unstressed syllables (e.g., *systematization*), which would also presumably have the last three syllables in the same foot (they do not discuss such examples, so I can't be sure). Neither does it account for the possibility of prepausal aspiration.[15] Once again, some modifications will have to be made in order to account for the full range of aspiration facts.

## 4. Accounts of flapping.

Once again, there are basically two kinds of analyses, those in which flapping is sensitive to syllable structure and those in which it is sensitive to foot structure.

### 4.1. Accounts based on syllable structure.

For the proponents of ambisyllabicity, it is the ambisyllabicity of an alveolar stop that triggers flapping, while for the total resyllabification approaches, simply being in syllable-final position is enough to trigger flapping. The total resyllabification approaches would appear to have the edge in view of the correct prediction that prepausal and pre-/h/ flapping is possible (although recall that such approaches, like the ambisyllabicity approaches, cannot account for the possibility of aspirating such stops). All accounts have other problems, as well, again depending on whether or not resyllabification puts consonants into a necessarily stressed syllable. If the left-hand syllable must be stressed, then it is impossible to account for the flapping in cases like *monitor* and *systematization*. If consonants may be resyllabified into an unstressed syllable, then such cases are predicted correctly, but we would also expect flapping in *Mediterranean*-type examples. Furthermore, neither kind of approach can account for the context-free flapping of /d/ and /n/ in rapid speech.

### 4.2. Accounts based on foot structure.

Kiparsky's account is too complicated to go into here, but it can be shown that it has problems that are identical to, or related to, those facing other foot structure-based approaches, in addition to those that Hammond and Gussenhoven have bought up. In these other foot-based approaches, flapping applies either foot-medially or when not foot-initial. In the first of later approaches, it is impossible to account for the possibility of flapping (foot-final) prepausal or pre-/h/ stops, whereas the second kind of analysis predicts correctly that they are flappable (though not that they are also aspirable, as pointed out in section 3.2). Assuming, however, as in section 3.2, that the final three syllables in cases like *systematization* belong to the same foot, neither kind of approach can account for the flapping found in such cases. Once again, all of the analyses considered will require some modification if they are to account for the full range of facts concerning flapping.

---

[14] McCarthy 1982 has argued on independent grounds for a similar foot structure in such cases.

[15] See also Hammond 1982 and Gussenhoven 1986 for criticisms of Kiparsky's treatment.

## 5. Accounts of glottalization.

Due to the lack of solid data, I will discuss only one of the contexts for glottalization, when the stop in question is followed by a homorganic stop. Recall first of all that flapping is in fact applicable if the following stop is a syllabic nasal, but is not homorganic to the preceding stop, as in *bottom*. This is as predicted on all accounts, since the relevant stops are syllable-final and foot-medial. But there would appear to be no reason why flapping should not also apply in cases like *button*. The reason it is blocked appears to be that it is physically impossible to have a flap followed immediately by a homorganic stop: if a flap is produced, the alveolar closure must be released, and the flap would thus be immediately followed by something other than the stop (some kind of schwa-like vowel, presumably). That is, the oral closure of a stop is not released when this stop is followed by a homorganic stop. This appears to be strong evidence in favor of Selkirk's proposal (373) that 'a voiceless stop ... is glottalized when it is not released ...', since there would be a single environment for glottalization on this analysis.[16]

## 6. An alternative account.

Before discussing the analysis which I propose to better account for the full range of facts, I must address an issue that thus far has been treated only cursorily, namely the role that morphological structure plays in determining which allophone will surface. Selkirk suggests (360) that 'the limits of word affixes [in the sense of Selkirk 1982b – i.e . post-level 1 morphology in level-ordered theories] always coincide with a syllable limit ...', and it seems to me that this is at least very close to being the truth. This allows an explanation for why flapping is possible in *elitism* (assuming, for the moment, that syllable-final position is one of the conditions on flapping of /t/, and that (this) *-ism* is in fact a 'word affix'):[17] since a syllable boundary is required to be present after the /t/, this consonant cannot become an onset of the final syllable, despite the fact that this syllable bears stress. Similarly, one can explain Hockett's (1958) observation that there is a 'junctural' difference between the words *minus* and *shyness*, with the latter having an internal juncture before the /n/, and the former having no internal juncture at all. Adopting something like Selkirk's proposal – and assuming, presumably uncontroversially, that *-ness* is a word affix – allows us to identify precisely what this junctural difference corresponds to, namely a syllable boundary (as enforced by the presence of a word affix boundary). If, as suggested in section 2, the total resyllabification approach is adopted, then the syllable boundary will be located after the *n* in *minus* only.[18]

---

[16] Jensen 1990 admits that these data cannot be readily accounted for under his analysis.

[17] There is probably more than one suffix that has the phonological representation /-ɪzm/. Note that the /t/s in *magnetism* and *hypnotism* are aspirated, rather than flapped. Since the latter two cases have bases that are either a noun or a bound stem, while *elitism* has a base that is an adjective, this claim would appear not to be as ad hoc as it might on first glance.

With this rudimentary knowledge of how the morphology interacts with the phonetics/phonology, we can now turn to the latter aspect of the phenomena under discussion. As suggested above, I believe that it is necessary to make heavy use of two features that are almost certainly not in underlying representations, which I will label [released] and [short]. With these two features at our disposal, we can state the environment for aspiration as a [-short, +released] voiceless stop, that for flapping as a [+short, +released] alveolar stop (as Goman 1981 has proposed in a somewhat different formalization) that is preceded by an appropriate segment, and that for glottalization as a [-released] voiceless stop (as Selkirk 1982a has proposed). These rules are formalized in (4).

(4) a. [-cont, -voi, -short, +released] — [+asp]
b. [+alv, -cont, +short, +released] — [+approximant] / [-constriction] ___
c. [-cont, -voi, -released] — [+glot]

I do not intend for these rules to be taken as serious proposals as to what is the proper featural characterization of flaphood, the kind of segment that may precede a flap, or glottalization (I follow Stampe 1973 and Goman 1981 in characterizing flaps as [+approximant], and Church (1983:75-7) for the [-constriction] part of the rule: [+glot] is my own adhocism). Indeed, given that a flap is not an approximant (although the 'super-flap' discussed in section 1 is), there is some discrepancy between the output of this rule and (one of) the relevant allophones. Nevertheless, I feel that, as a first approximation, these rules are of some value. Note that employing the [+released] specification in (4b) eliminates the need for specifying what class of things may follow a flap, which is a strong argument in favor of this kind of account, in view of the superficially unnatural nature of this class (syllabics, /h/, and pause). (For related discussion, and a comparison of Selkirk's version of this rule with that of Kahn, see Selkirk 1982a:378.)

---

[18] There are two phonetic correlates of this junctural difference, at least in my (basically central Michigan) speech, the duration and height of the diphthong, and the readiness with which the /n/ flaps. The vowel is shortened and the (first half of) the vowel is raised in the case of *minus*, but not for *shyness*, and the /n/ flaps much more readily in the former case than in the latter, where flapping may occur only in rapid speech. The reason for the resistance of *shyness* to flapping is, again, that the /n/ is not syllable-final in *shyness*, but it is in *minus*. As for the vowel shortening, it is not clear precisely what the environment is, although it presumably cannot be foot-medial before a voiceless consonant, as Kiparsky 1979 has suggested (for raising – he does not discuss the concomitant shortening), in view of the case under discussion, as well as others like *high chair*, *high school*, and *bicycle*, all of which show shortening/raising in environments other than that given by Kiparsky (at least in some dialects – I have heard the latter uttered by Bill Cosby without raising). I suspect that being foot-internal when a voiced consonant follows is in fact crucial for the ultimate statement of this rule or rules. If this is the case, then, in order to account for the failure of shortening to apply in *shyness*, Church's (1983:230n) suggestion that '[word affix] boundaries determine foot structure', i.e., that such boundaries block not only resyllabification, but also foot construction (although he presents no evidence for it and 'does not explore this possibility ...') must be correct.

Notice now that (4b), because it does not require the output to be [+voiced], will produce a voiceless flap when /t/ is the input. This is exactly what we find before /h/ and pause, but elswhere, of course, the voiceless flap will have to become voiced somehow.[19] I suggest the rule in (5) (cf. Stampe 1973, Goman 1981):

(5) [-cont, +alveolar, +approx] — [+voi] / __ [+voi]

Selkirk (1982a:378) has proposed a somewhat different account, in which the flapping rule produces a voiced segment directly, which in turn is subject to devoicing when prepausal (or followed by a voiceless segment – she was apparently not aware that flapping can occur before /h/). If this account is correct, then /t/, /d/, and /n/ should all be subject to devoicing before pause (and /h/), but in fact only /t/ surfaces as voiceless in such environments. Thus, not only is Selkirk's account more complicated than mine, it also overgenerates voiceless flaps. The question now becomes how the right values for these features are assigned. Due to the problems with the glottalization data, I cannot give the assignment of [-released] the attention which it must eventually be given. As for [short], the unmarked (default) case is [-short]. A consonant can become [+short] for a variety of reasons. First of all, it can be in a rime.[20] Even if it's not in a rime, it can be short enough to be [+short] if one simply talks fast enough (this source of [+short] segments explains why /d/ and /n/ – which are inherently shorter than the corresponding voiceless stop (cf. Lehiste 1960)[21] – may flap in rapid speech even when in an onset). There must be at least one other way in which a [+short] stop can arise, if it is the second member of a (nessarily *s*-initial) cluster in an onset, in order to explain why there is no aspiration in words like *stub*, *spin*, and *skin*. The instrumental phonetic literature I have consulted (e.g., Lehiste 1960) seems to confirm this prediction of my analysis.

We are now in a position to suggest an alternative to Gussenhoven's account of aspiration in British English (cf. note 13). We can simply say that this variety lacks the rule that shortens consonants in a rime. Barring other processes that trigger shortening (note that stops after syllable-initial /s/ are not aspirated even in British English), voiceless stops, even if they are in a rime, can be aspirated. British English would also appear to have a rule that shortens a consonant when it is followed by a consonant, since voiceless stops in this environment do not show aspiration – except in hyperarticulate speech styles, where the effects of shortening will be undone (or prevented from occurring) due to the overall increased length of segments in such styles.

---

[19] In very careful speech, /t/ can have a voiceless flap allophone in all contexts.

[20] On Kiparsky's account, such consonants become [+lax]. I prefer the feature [short] on the basis of Fujimura and Lovins' observation that all articulatory distinctions between 'voiceless' and 'voiced' stops (the authors actually refer to these different kinds of stops as being tense and lax) except for 'mandible height' are neutralized when a stop is in a rime. If, as I suspect, mandible height is the articulatory correlate of the phonological feature tense/lax, then voiceless and voiced consonants must have different values for [lax] (or [tense]) even when they are in a rime.

[21] Lehiste actually claims just the opposite, but examination of the spectrograms on which she based this claim makes it clear that the only way it can be true is if she did not include the aspiration as being part of an aspirated stop when she made her measurements. If aspiration is in fact part of the consonant that is aspirated, as seems very likely, then singleton voiceless stops in an onset are in fact longer than the corresponding voiced stops.

There remains one major issue that has not been addressed, namely what rule(s) get(s) just the right consonants into rimes. Word-final position is unproblematic, as long as there no Kahn-style rightward resyllabification across word boundaries, since such consonants will be in a rime throughout the derivation. One of the conditions for (leftward) resyllabification will have to be lack of stress on the nucleus of the syllable that originally contains the candidate for resyllabification, since word-internal flapping occurs only before an unstressed syllabic. But does the preceding syllable have to be stressed or not? (Recall that flapping occurs when an unstressed vowel precedes when /t/ precedes a word-final unstressed syllabic, as in *monitor*, *reduplicative*, and when two unstressed syllables precede medially, as with *systematization*, whereas aspiration (apparently) applies when a voiceless stop precedes a penultimate unstressed syllabic that is followed by an unstressed syllable, as in the case of the /k/ in *reduplicative*, or when the preceding unstressed syllable is itself preceded by a stressed syllable, as in *Mediterranean*.[22]) What seems to be the generalization here is, with one exception to be discussed below, the following:

(6) /t/ may flap if, counting from the last preceding stressed syllable, it is in an odd-numbered syllable (syllabification according to principle (2)); a voiceless stop is (or tends to be) aspirated if it is in an even-numbered such syllable.

Unfortunately, words like *monitor* violate this generalization, since here the /t/ flaps despite the fact that (2) puts it in a syllable that is two syllables from the preceding stressed syllable. Ignoring this problem for the moment, one can observe a pattern of 'alternating flappability', which suggests strongly that metrical structure is somehow involved. It may be that, in English at least, the maximal word-internal foot contains two syllables, whereas a word-final foot may contain up to three syllables (although there seems to be no obvious explanation for why this should be), and that resyllabification takes only within a foot.[23] If this proposal is adopted, then a foot (a 'mini-foot'?) may consist not only of a single unstressed syllable, as Withgott has proposed, but also of **two** unstressed syllables, since the foot structure for *systematization* would presumably be something like [[system][ati][zation]]. Assuming this proposal, then, resyllabification can stated as follows:

(7) Put as many onset consonants as possible in an unstressed syllable into the preceding syllable, provided that doing so does not create an impossible syllable-final cluster, and no foot boundary is crossed.

Note that the latter clause thus predicts aspiration in words like *napkin* (even if the final syllable is unstressed), *Nootka*, and *Washington*. This correlates quite well with the pronunciations reported by Kahn and Gussenhoven, as well as my intuitions (although it should be recalled that Kahn reports variability for *napkin*, and that I seem to have variant pronunciations of *Ditka* – cf. note 4). It doesn't work nearly as well for those reported by Selkirk, however. Selkirk doesn't say whether the /t/ in *Washington* is aspirated (her analysis predicts that it is not), but it seems pretty clearly to be aspirated for me (compare *Acton*, *Stockton*, with unaspirated /t/s). Since this principle does not require that the relevant unstressed syllabic immediately follow a resyllabifiable consonant, it also predicts lack of aspiration in *April*-type words – appropriately for Kahn, Gussenhoven, and me, but incorrectly for Stampe/Selkirk-type dialects. (On the other hand, assuming, following Stampe and Gussenhoven, that resyllabification may move more than one consonant, it correctly gets both the *s* and the *t* in *Bostoŋ* into the first syllable – cf. note 9.) I have no plausible explanation for the apparently different behavior of *s*-stop clusters and stop-liquid clusters for such speakers.

---

[22] There appears to be some variation with respect to this latter kind of case, especially if a word is used frequently. Thus, I have observed an utterance of *climatologically* in which the /t/ was flapped (by a TV weatherman!), and I find flapping possible in *spirantization*, although aspiration is also possible here. I have even found one speaker (a Texan) who claims to regularly flap the /t/ in *Mediterranean*.

[23] I retain resyllabification even though foot structure is also involved, on this account, because of the phonetic evidence for it discussed in section 2.

This account is thus not perfect,[24] but I submit that it provides a significant increase in coverage of the relevant data. If this account is on the right track, then linguistic theory must allow for the possibility of strictly phonetic features playing a role in rules that account for allophonic variation.

## REFERENCES

Akmajian, Adrian, Richard A. Demers, and Robert M. Harnish. 1979. Linguistics: an introduction to language and communication. Cambridge, MA:MIT Press.

Anderson, John, and Charles Jones. 1974. Three theses concerning phonological representations. JL 10:1-26.

Anderson, Stephen R. 1982. The analysis of French schwa: or, How to get something for nothing. Lg. 58:534-73.

Andrésen, B. S. 1968. Pre-glottalization in English standard pronunciation. Oslo: Norwegian Universities Press.

Borowsky, Toni. 1986. Topics in the lexical phonology of English. U. Mass. dissertation.

Church, Kenneth W. 1983. Phrase structure parsing: a method for taking advantage of allophonic constraints. MIT dissertation. [Distributed by Indiana University Linguistics Club.]

---

[24] There are other apparent problems, which I can only mention, due to space limitations (although a number of possible ways around them suggest themselves). First, in words with /ks/-voiceless stop clusters in foot-medial position (*Baxter*, *Saxby*, *(Teddy) Ruxpin*), this account predicts that both the /k/ and the /s/ will be resyllabified (/ks/ is a possible final cluster), thus leaving the third member of the cluster alone in an onset. This in turn predicts that the latter should be aspirated, but they aren't, at least for me. (Note that both the *s* and the *t* in, e.g., *ostrich* and *mistress* must be resyllabified, in order to account for the lack of aspiration in the /t/s.) The /t/s in foot-medial /tr/ clusters seem to be preferentially aspirated for me (though not, apparently, for all speakers), despite the fact that neither of the other voiceless stops exhibit aspiration foot-medially before a liquid. This is especially puzzling in view of the lack of aspiration in of the /str/ clusters just mentioned. Also problematic is the aspiration found only in foot-medial /lt/ clusters. Finally, I have no explanation for the aspirated /k/ in my pronunciation of *Wisconsin* (cf. note 4).)

Churma, Donald G. 1990. Aspiration and flapping re-revisited. Buffalo Working Papers in Linguistics 90-01:31-52.

Cowan, Nelson, and Lewis A. Leavitt. 1981. Juggling acts with linguistic units. CLS 17 Paravolume:50-6.

Davidsen-Neilsen, N. 1975. A phonological analysis of English *sp, st, sk*, with special reference to speech error data. Journal of the IPA 5:3-25.

Fromkin, Victoria A. and Robert Rodman. 1988. An introduction to language. (Fourth edition.) Holt, Rinehart, and Winston: New York.

Fu, Yi-Chin. 1963. The phonemic structure of English words. Taipei: Rainbow-Bridge Book Co.

Fujimura, Osamu, and Julie Lovins. 1978. Syllables as concatenative phonetic units. [Distributed by Indiana University Linguistics Club.]

Goman, Roderick. 1981. On the natural phonology of consonants. Ohio State University Working Papers in Linguistics 25:107-73.

Gussenhoven, Carlos. 1986. English plosive allophones and ambisyllabicity. Gramma 10:119-41.

Hammond, Michael. 1982. Foot Domain Rules and Metrical Locality. WCCFL 1:207-18.

Hockett, Charles. 1958. A course in modern linguistics. New York: Macmillan.

Hoard, James. 1971. Aspiration, tenseness, and syllabification in English. Lg. 47:133-40.

Jensen, John. 1990. A prosodic account of stop allophony in English. Paper presented at the Toronto Workshop on Phonology.

Kahn, Daniel. 1976. Syllable-based generalizations in English phonology. MIT dissertation. [Distributed by Indiana University Linguistics Club.]

Kaisse, Ellen M. 1985. Connected speech: the interaction of syntax and phonology. New York: Academic Press.

Keating, Patricia. 1988. The phonetics/phonology interface. Linguistic theory: foundations (Linguistics: the Cambridge Survey, vol. 1.), ed. by Frederick Newmeyer, 281-302. Cambridge: University Press.

Kiparsky, Paul. 1979. Metrical structure assignment is cyclic. LI 10:421-41.

Krakow, Rena. 1989. Inter-articulator timing and syllable structure. LSA paper.

Lehiste, Ilse. 1960. An acoustic-phonetic study of internal open juncture. New York: S. Karger.

Malécot, André. 1960. Vowel nasality as a distinctive feature in American English. Lg. 36:222-9.

McCarthy, John J. 1982. Prosodic structure and expletive infixation. Lg. 58:574-89.

Picard, Marc. 1984. English aspiration and flapping revisited. Canadian Journal of Linguistics 29:42-57.

Pulgram, Ernst. 1970. Syllable, word, nexus, cursus. The Hague: Mouton.

Selkirk, Elisabeth. 1982a. The syllable. The structure of phonological representations, II, ed. by Harry van der Hulst and Norval Smith, 337-83. Dordrecht: Foris.

Selkirk, Elisabeth. 1982b. The syntax of words (Linguistic Inquiry Monograph, no. 7). Cambridge. MA:MIT Press.

Stampe, David L. 1973. A dissertation on natural phonology. University of Chicago dissertation. [Published, with annotations, 1979. Garland Publishing.]

Withgott, Mary M. 1982. Segmental evidence for prosodic domains. University of Texas dissertation.

ESCOL '90 55-66

# INTERPRETING REFLEXIVES IN COORDINATE NPS: EVIDENCE FOR A NON-SYNTACTIC ANALYSIS OF NP COORDINATION[1]

Wayne Cowart
University of Southern Maine

## Theory of coordination.

The standard analysis of coordinate compound NPs is illustrated schematically in Figure 1. Here D, E and F are taken to be coordinate nodes.

In the context of cognitive theory, I will assume there is some cognitive mechanism of a discrete combinatorial character that implements knowledge of sentence structure. I take the coordination scheme represented in Figure 1 to assert of this device that it regards each of D, E, and F to be equivalently related to B and all other nodes outside the coordinate structure. More generally, it implies that this device captures whatever relation exists between the tree as a whole and the nodes C dominates within the same general framework as is used to express relations between A and any nodes it might dominate, between phrasal nodes and their heads, etc.

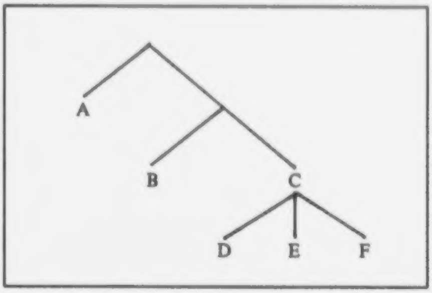


**Figure 1**: Phrase structure tree with coordinate compound structure in object position.

## Method

I will address these issues through the experimental assessment of linguistic intuitions, specifically, the intuitions of a haphazard assortment of university undergraduates.

Each participant in the experiments reported below was presented with a list of about 150 items, each of which was structured essentially as shown in Table I. For each item, the subject was asked to indicate on a four point scale whether the sentence seemed fully normal, and understandable or very odd, awkward or difficult to understand, or somewhere between. It was stressed that there were no 'right' or 'wrong' answers. Subjects were asked to base their responses solely on gut reactions, not on rules they may have learned about what is 'proper' or 'correct' English.

Experimental items were embedded in a longer list of filler items of diverse kinds. This is to suppress any tendency to adopt special strategies that may emerge when a particular sentence type is presented repeatedly.

**Table I**: Illustrative example item from a sentence questionnaire.

114. Ms. Shackleton knows that the Aleut children adore the kitten and herself.

| OK | | | Odd |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

This task seems to be quite sensitive to differences in degree of acceptability across sentences and sentence types. Furthermore, many of the differences it detects prove to be notably stable when they are assessed by way of standard statistical tests or replication. We might therefor imagine that some set of English sentences can be represented as a set of points scattered across on a plane. Rising from each point is a rod whose height reflects the degree of acceptability of the sentence associated with the point below. If a sheet is draped over the collection of rods, a complex surface will emerge. The task I've described is useful for exploring that surface.

**Assumptions linking the method to syntactic theory and processing theory**

My intention is to hold a complex of theories responsible for data obtained with this method. That complex includes 1) syntactic theory, construed as an account of some conceptual resources available to represent sentence structure, 2) the processing theory that applies those conceptual tools to real utterances within the constraints of its memory limits, etc., and 3) any other component of the cognitive system that may participate in the interpretation of utterances. There is, so far as I am aware, no way to interpret results obtained with this method in such a way that they bear solely upon the processing theory, the syntactic theory, or any other aspect of the cognitive theory of linguistic ability. In terms of the imaginary sheet I described a moment ago, the topography of this surface is seen as the net product of all the cognitive resources that participate in language comprehension. Thus the forms we find in this surface are relevant to our understanding of all the conceptual systems and mechanisms that support it.

**Experiment 1**

Applying standard assumptions, the order of elements within the coordinate NP should not differentially affect the grammaticality of sentences like (1) and (2).

(1) John believes that Mary likes Bill and himself.
(2) John believes that Mary likes himself and Bill.

Both of these examples are excluded for the same reasons as would be (3).

(3) John believes that Mary likes himself.

The experiment reported here was an attempt to address two questions related to these matters. First, is there an order effect? That is, is there some reliable difference in acceptability between cases similar to (1) and ones similar to (2)?

Second, if there is an order effect, what is the relation between the mechanism that implements it and the grammatical mechanisms that reconstruct the constituent structure of the sentence as a whole and those which implement the constraints on reference relations that are expressed by the binding theory (Chomsky, 1981).

### Materials

The experiment was based on materials such as those shown in Table II.

The contrast between the first and second rows of Table II implements the linear order contrast discussed above. This will permit a straight-forward test of the question whether there is in fact a linear order effect.

**Table II**: Materials for Experiment 1.

| | *Infinitive Complements* | *That-Complements* |
|---|---|---|
| *Reflexives 1st* | Amundsen's team believed Scott to doubt themselves and the Danes. | Amundsen's team believed that Scott doubted themselves and the Danes. |
| *Reflexives 2nd* | Amundsen's team believed Scott to doubt the Danes and themselves. | Amundsen's team believed that Scott doubted the Danes and themselves. |

The contrast between infinitive complements and that complements in Table II is intended to assess how any process implicated in linear order effects is related to the mechanisms that reconstruct and interpret the syntactic structure of the sentence. The strategy employed here is to implement some contrast that seems likely to exercise core mechanisms of syntactic analysis and then check to see whether this manipulation interacts with any order effect.

It must be acknowledged that all of the sentences in Table II are relatively unacceptable[2].

### Results

The results were summarized in two ways. One procedure yields the fraction of all the cases in a cell that were given the highest of the four possible scores. Summaries of this sort are referred to below as "percent data". The other procedure averages all of the responses obtained in a given cell. Summaries of this sort are referred to as "average data." The percent data have the advantage that they are somewhat more readily interpreted than the average data and the disadvantage that they do not use all of the information in the data set. While the average data makes better use of all the available information, it is not likely that all subjects were using the scale in the same way to reflect changes in perceived acceptability. Because of these disparities, it seemed prudent to perform relevant statistical tests on by-subjects and by-sentences summaries of both the percent and average data.

The theoretical issues discussed above lead to three empirical questions about these results. First, does word order within the coordinate NP exert a reliable effect on the acceptability of sentences? Second, does the contrast between complement types reliably affect acceptability? Thirdly, is there a reliable interaction between these two factors?

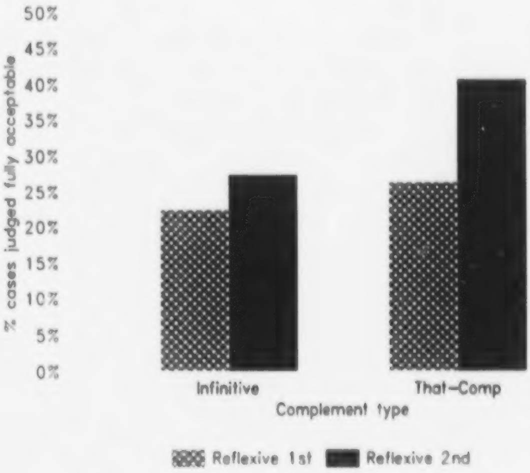


**Figure 2**: By-sentences percent data from Experiment 1.

**Table III**: Materials for the Experiment 2.

| | *Proximal Antecedent* | *Remote Antecedent* |
|---|---|---|
| *Reflexives 1st* | Amy believes the two Commissioners admire themselves and the mayor. | The two Commissioners believe Amy admires themselves and the mayor. |
| *Reflexives 2nd* | Amy believes the two Commissioners admire the mayor and themselves. | The two Commissioners believe Amy admires the mayor and themselves. |

The percent data results for sentences are summarized in Figure 2. The data summarized by this figure suggest that there were effects for Order and Complement Type, as well as an interaction between these two.

The Order variable did in fact produce a highly robust overall effect ($p < .01$), in all four analyses. The Complement Type variable likewise produced a highly robust effect in all four analyses. However, The interaction between Order and Complement Type was significant only in the by-subjects percent data (at the $p < .05$ level). Though these results are not uniform, the best conclusion seems to be that there was no interaction. Note, however, that this could prove to be a Type II error.

## Discussion

This evidence indicates that linear order within the coordinate expression can affect acceptability. Whatever mechanism produces this effect does not seem to be sensitive to the syntactic manipulation used here, the contrast between complement types. This supports the view that the origin of the order effect lies outside whatever ensemble of mechanisms copes with the complement type contrast.

It may be, however, that this evidence for a non-syntactic view of the order mechanism (the lack of an interaction) arises only because the sentences used here were ungrammatical.

I will defer most discussion of possible analyses of the order effect until more data is available. Suffice it to say that two accounts of the order effect will be considered; both predict that if the antecedent in the matrix clause in Experiment 1 were moved into the lower clause, the order effects will be reversed.

## Experiment 2

Experiment 2 addresses two questions arising from the results of Experiment 1. First, is the order effect attributable to processes that are unique to ill-formed or marginal sentences? Second, it provides cases with a lower clause antecedent for the reflexive to see whether in fact this will provide a new order effect favoring reflexives at the beginning of coordinate structures.

As shown in Table III, Experiment 2 crossed the order factor from Experiment 1 with an antecedent location factor that either placed the nearest possible antecedent for the reflexive in the lower clause of a two-clause sentence (the Proximal case), or in the higher clause (the Remote case).

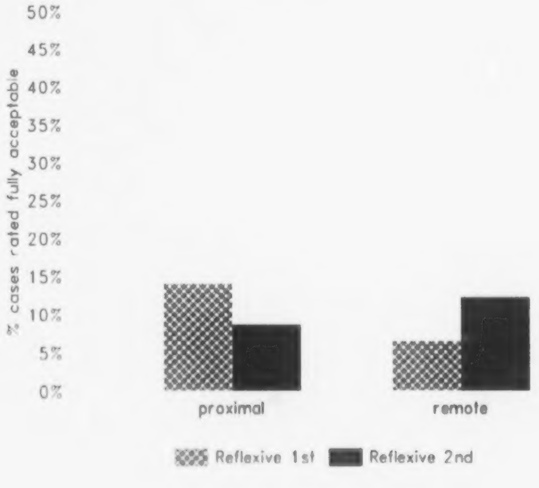


Figure 3: By-sentences percent data for Experiment 2.

## Results

The by-sentence percent data are summarized in Figure 3. These results replicate the order effect from Experiment 1 in the Remote condition and show an order effect favoring initial reflexives in the Proximal condition. That is, there appears to be an interaction between the location of the antecedent and the pattern of the order effect.

The apparent interaction is real. This effect is statistically robust in all four analyses ($p < .01$ in three cases, $p < .05$ in one).

The individual order effects, in both cases, are statistically robust by the .05 criterion in two analyses, marginal in one, and non-significant in one. In the light of the earlier result, and the statistical similarity of the two effects, it seems likely that both are reliable. There is no overall main effect of antecedent location or reflexive order.

The overall acceptability values are much lower in these results than in the previous experiment. The source of this disparity is unclear.

## Discussion

One possible account of the earlier result stresses the fact that all the experimental sentences are standardly regarded as ungrammatical (i.e., they violate binding principle A). The new result disposes of this analysis. The Proximal cases are not reliably more acceptable overall than are the Remote cases, yet they do show an order effect.

The results of Experiment 2 reinforce the evidence that there are order effects and show that those effects seem to be dynamically sensitive to features of the sentence external to the coordinate structure.

## General Discussion: Two analyses

This section examines two possible accounts of the order effects described above.

In formulating both of these accounts I will assume that there are two mental representations that are potentially relevant to an account of the effects described here. One of these is a syntactic representation that captures the same properties of a string of lexical items as are represented in a phrase marker. Most critically for these purposes, these properties include several kinds of syntactically relevant information about the lexical items and an analysis of the hierarchical constituent structure implied jointly by the syntactic properties of the lexical items and the linear order in which they occur. A second kind of representation will be termed post-syntactic. This is assumed to be a linear, non-hierarchical sequence of complex semantically analyzed units. In the simplest and most characteristic case, each unit is based on a single sentence. Thus, this representation might be seen as the base from which the recovery of relations among sentences begins in the analysis of discourse structure. Note, however, that it is not necessary that all units that enter into the post-syntactic representation be full sentences. By hypothesis, parentheticals and other fragmentary, sub-sentential material can also be represented as units in the post-syntactic representation.

I will further assume that the processing system provides at least two kinds of antecedent finding mechanisms. One mechanism is structural in character and relies heavily upon the syntactic representation of the sentence to detect or promote some potential reference relations and to block others. Another is concerned primarily with reference relations at the level of discourse and is presumed to operate on the post-syntactic representation of an utterance. It is able to establish sentence internal and external reference relations without regard to syntactic relations that do or do not hold among the relevant constituents, so long as no syntactically based impediment to a relation has been asserted by the structural mechanism[3].

## First Account

The first account of the order results might be seen as the default, the account that most nearly respects the general outlines of current syntactic theory and processing theory. On this account, the appearance of the first conjunct in a coordinate NP object induces closure on the clause, as though it were the sole NP object. In consequence of achieving apparent closure on the clause, the syntactic representation of the sentence decays rapidly in memory[4]. In the Remote case, where the antecedent is in the higher clause, a reflexive in first position in a coordinate structure invokes operations on a relatively intact syntactic representation of the lower clause that makes the impediment presented by that clause more salient. When the reflexive is in second position within the coordinate structure it invokes parsing operations on a deteriorated syntactic representation that makes the lower clause impediment less salient and thus leaves the discourse mechanism freer to establish a relation between the reflexive and the matrix subject when this material becomes a unit in the post-syntactic representation.

With proximal antecedents first position reflexives are more readily interpreted because the enhanced availability of syntactic information facilitates the identification of the local antecedent via structural mechanisms operating on the syntactic representation.

So far as it goes, this account successfully predicts the obtained effects. I will argue, however, that it has two deficiencies, one arising from its processing assumptions and the other from its syntactic assumptions.

There is ample evidence, some of it now quite old, that syntactic representations do in fact deteriorate quite rapidly, especially once a clause boundary is detected (Jarvella, 1971, Caplan, 1972, Sachs, 1967, Fodor, Bever & Garrett, 1974). However, the present account is essentially predicting that every object NP coordinate structure will induce garden path effects. The appearance of each second and later conjunct surprises the parser and forces reanalysis of the structure previously assigned to the object NP[5]. This does not seem correct. Further, even if some other mechanism of inducing the relevant loss of memory within the syntactic processor could be defined, it seems that the pace of memory loss that any such account must posit is suspiciously brisk. In the sentences used here, only one or two words intervene between the head of the first conjunct and the head of the second. Yet, for the account to work, we must assume that important clause internal information is lost over that span.

The second objection to the default analysis concerns the syntax of coordinate NPs that it assumes. Phrase structural analyses serve as frameworks over which various kinds of linguistic relations can be expressed. A troubling feature of the standard analysis is that it provides a framework within which linguistic relations holding between conjuncts can be expressed, yet it seems that such relations rarely arise. There is, of course, ample evidence that each conjunct enters into syntactic relations with constituents outside the NP and that the internal structure of each conjunct is appropriately represented in phrase structural terms. However, there appears to be relatively much less evidence of syntactic relations *among* the conjuncts within a coordinate NP. For example, though some speakers can accept conjunct to conjunct reference relations in cases like those in (4), these cases seem much better when the pronoun is simply replaced by the name to which it is referentially linked.

(4) a) John saw Mary and a picture of herself.
b) John saw Mary and a picture of her.
c) Mary or pictures of herself appeared every day of the campaign.

In pairs like (5) it seems that backward coreference is harder to achieve when the antecedent is coordinate with the NP containing the pronoun.

(5) a) I spoke to her friends and Mary.
b) Her friends admired Mary.
c) I spoke to the people she worked with and Mary.
d) The people she worked with admired Mary.

These cases suggest that there is some factor that militates against pronoun-antecedent relations that reach from one conjunct to another within a single coordinate structure. If this is a reflection of a general dearth of conjunct to conjunct relations, then it seems that the standard analysis of coordinate NPs provides for a kind of linguistic relation between constituents that either does not occur or occurs far less frequently than do the other relational opportunities the same structure affords.

## Second Account

An alternative account of the order effects reported above can be constructed by assuming that the syntactic and post-syntactic representations play somewhat different roles with respect to coordinate structures. In this alternative account, the syntactic representation includes only a single node in the position where the root node of the compound expression would otherwise appear. Conjuncts beyond the first are realized as separate units in the post-syntactic representation. Semantically based processes operating on the post-syntactic representation recover the relation between later conjuncts and the balance of the sentence by a process of analogy that successively substitutes later conjuncts for the first. On this analysis, two conjuncts are never simultaneously present in the syntactic representation. This entails that there can be no *syntactic* relation that links material internal to one conjunct with material internal to another. This account assumes, like the first, that when the first conjunct in a coordinate structure appears, this permits closure on the analysis of the clause. This in turn will induce the rapid loss of clause internal information as before. However, now the surface evidence of the coordinate structure will act as cues to discourse processes that later conjuncts must be integrated with the preceding sentence. The essence of this story is the claim that the relation between each conjunct and the superordinate NP node (in the standard analysis) is qualitatively different than that between, say, a PP node and an NP within the PP.

This account readily explains the order effects reported above, and it does this in a way that is quite similar to the default account offered earlier. The important difference is that here the necessary rapid loss of syntactic information is explained by the claim that coordination is not represented in the syntax. The earlier account achieves the effects by positing processing difficulties early in the coordinate structure that seem hard to motivate. A further advantage of the second account is that it offers an explanation for the apparent paucity of the conjunct to conjunct relations whose existence seems to be implied by, or at least readily tolerated by, the standard account of coordination.

The non-syntactic account of coordination can also be extended to other problems. For example, there is a puzzle based on some cases first noticed by Paul Postal[6]. Sentence (6)a) illustrates the familiar fact that uncertainty of pronoun reference produces only a modest decrement in acceptability. Sentence (6)b) shows that pronouns can take antecedents inside of coordinate structures. Why then does it seem that (6)c) is worse than (6)a) when (6)c) is taken to have a sentence-internal antecedent?

(6) a) Dick told Fred he was smart.
b) Dick and Jane said that he was smart.
c) Dick and Fred said that he was smart.

On the account of coordination discussed here these effects are anticipated. The structure is interpreted as two sentences, one asserting that Dick said that Dick was smart and the other asserting that Fred said that Fred was smart, but with **Fred** and **Dick** referring to the same individual in virtue of each being the antecedent of the one pronoun.

In this presentation I will not attempt to address the question whether the coordinate structure as a whole is a constituent. Note, however, that the non-syntactic analysis I have put forward does not necessarily deny the unity of the compound expression in so far as this unity might be reconstructed in the post-syntactic representation. What it does is to make an importantly different claim about how that unity is attained.

The most difficult problems raised by the non-syntactic analysis of coordination seem to bear on semantic theory. Many theories of the semantics of coordinate structures crucially assume the standard phrase structure analysis. In particular, the group reading commonly associated with coordinate NPs may be difficult to reconstruct in the absence of coordination within the syntax. Thus, the non-syntactic account of coordination seems to threaten the principle of compositionality in this respect. There may also be problems with implementing agreement when coordination is not represented in the syntax.

These are important problems and it may be that they cannot be resolved within a non-syntactic analysis of coordination. Nevertheless, it is not clear that these constitute decisive objections to the proposal made here. It may be, for example, that some reasonable notion of compositionality can be preserved by a mechanism operating at the level of the post-syntactic representation.

In agreement a logical distinction exists between the task of determining the number property of an NP, the task of establishing the relevant NP to V link, and the task of implementing agreement on the V. The non-syntactic analysis of coordination seems problematic with respect only to the first of these issues. There is evidence, however, that the determination of number is not reliably a grammatically determined property of the NP. First, there are cases of notional number where extragrammatical considerations clearly determine the number property assigned to an NP (e.g., the contrasting treatment of 'corporate' nouns in American and British English, "the government is..." vs. "the government are..."). Though these can be treated as exceptions, they at least raise some doubt about the necessity of all agreement being founded on some compositional evaluation of the coordinate NP. Second, viewed as just one of a number of kinds of linguistic relation that can be laid over phrase markers, a notable feature of agreement relations is that they seem to be associated with a higher frequency of performance errors than are other sorts of relation (e.g., reference relations expressed by the binding theory). This lends some support to the suspicion that these relations have a significantly different basis than do other relations that prove to be more robust in performance[7].

There is, of course, at least one kind of relation that clearly operates from conjunct to conjunct and that is the requirement that the conjuncts be similar to each other. I will observe only that this is a relation of a very different flavor than most others laid out along the branches of a phrase structure tree. Further work must address the question whether this relation can be revealingly expressed within the framework proposed here.

On balance, a non-syntactic account of coordination along the lines suggested above seems to merit further study.

## FOOTNOTES

1. I am grateful to Kay Bock, Helen Cairns, Terry Langendoen, Bob Levine, Dana McDaniel, Shigeru Miyagawa, Craige Roberts, Barb Scholz, and Mark Steedman for helpful discussions related to these matters. This presentation is preliminary to a more detailed paper now in preparation. Address correspondence to: Language Sciences Laboratory, USM, 96 Falmouth St. Portland, ME, 04103. E-mail: *cowart@portland.bitnet* or *cowart@portland.maine.edu*
2. See, however, Zribi-Hertz (1989) for evidence suggesting that related forms may be acceptable in at least some circumstances.
3. See Cowart and Cairns, 1987, for relevant evidence and further discussion of this distinction.

4. Note that the relevant loss of memory induced by closure can't be for lexical material because this would not predict the advantage of second position reflexives with remote antecedents. But if we make a distinction between memory for lexical material and memory for the syntactic representation (treating the latter as an independently stored annotation of the lexical material) we may be able to explain the result by reference to the decay of this representation.
5. According to Pritchett's (1987) Theta-Reanalysis Principle the process of incorporating later conjuncts into the coordinate structure should be the kind of reanalysis that the parser finds painless since the appearance of subsequent conjuncts does not force the assignment of the first conjunct to a new theta role outside the one to which it was first assigned. While this account predicts smooth integration of a series of conjuncts under one theta role, it provides no account at all of the order effects observed here.
6. I am indebted to Terry Langendoen for calling these cases to my attention.
7. Bock and Miller (in press) report experimental work on agreement that may shed some light on these issues. Their work also suggests that these problems may be more tractable than generally supposed.

## REFERENCES

Bock, Kathryn & Miller, Carol A. In press. Broken agreement. Cognitive Psychology.

Caplan, D. 1972. Clause boundaries and recognition latencies for words in sentences. Perception and Psychophysics 12.73-76.

Chomsky, N. 1981. Lectures on government and binding. Dordrecht: Foris.

Cowart, W. & Cairns, H. 1987. Evidence for an anaphoric mechanism within syntactic processing: Some reference relations defy semantic and pragmatic constraints. Memory and Cognition 15.318-331.

Fodor, J.A., Bever, T.G., & Garrett, M.F. 1974. The Psychology of Language. New York: McGraw-Hill.

Jarvella, R. 1971. Syntactic processing of connected speech. Journal of Verbal Learning and Verbal Behavior 10.409-416.

Pritchett, Bradley L. 1987. Garden path phenomena and the grammatical basis of language processing. Ph.D. Dissertation, Harvard University.

Sachs, J.S. 1967. Recognition memory for syntactic and semantic aspects of connected discourse. Perception and Psychophysics 2.437-442.

Zribi-Hertz, Anne 1989. Anaphor binding and narrative point of view: English reflexive pronouns in sentence and discourse. Language 65.695-727.

ESCOL '90 67-78

# THE RESULTATIVE *DE* AS AN INFLECTIONAL MORPHEME IN CHINESE[*]

John Xiang-ling Dai
The Ohio State University

## 1. Abstract

Several arguments are advanced for the claim that the resultative marker DE is an inflectional morpheme in standard Chinese, in contrast with the homophonic adjectival *de* and the adverbial *de*, which are words. First of all, DE is not a syntactic word but a bound morpheme, because it is subject to the left but not right syntactic expansion. Given its obligatory phonological and morphosyntactic attachment to the preceding verb, DE cannot be a complementizer (COMP). By metatheoretical considerations of markedness, DE should be treated as an affix rather than a clitic. Supporting evidence comes from its high degree of selection on hosts. DE is an inflectional morpheme rather than a derivational one, mainly because of its syntactic relevance in the resultative construction. These arguments not only enlighten linguists about inflectional morphology in Chinese but also support an analysis in which the head of the matrix predicate VP must be the first verb (V1), rather than the second (V2), for V1 is where the morphosyntactic locus is found in the construction. Since the present analysis entails a verb subcategorization frame for [+V] phrase, the Chinese Phrase Structure Constraint no longer need be stipulated in the grammar, given the assumption that an NP object is also subcategorized for, and that Chinese phrase structures default to binary branching.

## 2. The Morphology of Chinese

Doing linguistic research on a well-known language still leads to surprises. The discovery of indirect and subtle evidence sometimes gives rise to an unexpected analysis. For example, Zwicky & Pullum (1983) present six lines of evidence for the English *-n't* in *He isn't going to school* as an inflectional morpheme, rather than a clitic as commonly assumed. They also cite Maling's (ms.) evidence for *near* in *near the wall* as an adjective taking an NP complement, instead of a preposition, and for *like* and *worth* as prepositions instead of adjectives.

Perhaps few linguists nowadays still believe that Chinese has little or no morphology. Reference grammars by linguists such as Chao (1968) and Li & Thompson (1981), etc. have presented a fairly long list of affixation and compounding processes in the language. Dai (1990a) explicitly argues that some components of compounds in a traditional sense can be analyzed as relatively productive derivational affixes, thus enlarging the role of affixation in the morphology of Chinese. The fact that no language lacks both affixation and compounding is one of the reasons Joseph & Janda (1988) propose that morphology is at the center of grammar, relative to syntax, semantics, phonology and other grammatical components. Chinese, often cited as the typical isolating or analytical language, i.e., with a putative one-to-one mapping between morphemes and words, is no exception in this respect.

---

[*] I am greatly indebted to Brian Joseph, Jonni Kanerva, Mark Libucha, Yong-kyoon No, Carl Pollard, and Arnold Zwicky for their comments on and criticism of the early presentations of this paper. None of these people necessarily agrees with the paper's conclusion, and responsibility for any remaining errors is mine alone.

However, we know of no serious analyses of Chinese inflectional morphology in the literature. On the one hand, lip service has been paid to the extent that Chinese is said to be in the process of gaining inflectional morphemes; on the other hand, it is taken for granted that some verbal aspectual markers like the progressive *-zhe*, the perfective *-le*, etc. are inflectional morphemes. But the dominant view seems to be that Chinese has no (interesting) inflectional morphology to study.

This paper is intended as a pioneer study for filling the gap concerning inflectional morphology in Chinese linguistics. We hope to formally demonstrate, and therefore claim, that the resulative DE is an inflectional morpheme. This result is surprising, given the traditional view that it is an acategorial particle word or clitic. The theoretical consequences of this claim will be briefly discussed.

## 3. The Division of Derivational Morphology and Inflectional Morphology

Following Anderson (1988) and Zwicky (1987, 1989), we adopt the fundamental theoretical assumption that derivational morphology (DM) and inflectional morphology (IM) constitute separate (sub)components of grammar, even though the apparent distinction between IM and DM in formal operations is minimal. Both deal with word structures, and operations like affixation, vowel or consonant mutation, reduplication, metathesis, etc. are available for both of them. The distinction, however, can be motivated only on theory-internal grounds: IM consists exactly of those aspects of word structures that are syntactically relevant, i.e., determined by or accessible to syntactic rules. DM, on the other hand, relates the stems of different lexemes, in contrast to IM, which relates the stem of one lexeme with its forms. Hence DM is of lexical function, i.e., deriving a new word, say, *nation-al* from the source word *nation*; and IM is of syntactic relevance, determining, say, the [PSP] form of the word *work* as *work-ed* in *has worked*, marking certain syntactic constructions.

Given that the distinction between IM and DM is one of our assumptions about the organization of grammar, we would expect there to be some behavioral characteristics distinguishing the two grammatical subcomponents.

First, inflectional morphemems may not change syntactic category. Thus the forms [PRP] *-ing* and [PRS SG 3] *-s* should not change the part of speech of its host verb *work*, as in the case of *working* and *works* in *He is working now* and *He works everyday*. But the ability of a derivational morpheme is not so restricted, e.g., *nation* is a noun, but *nation-al* with *-al* is an adjective.

Second, inflectional morphemes apparently indicate the syntactic relationship between the host and another word in a phrase or a sentence. Derivational morphemes are irrelevant in this regard. Thus *-ing* adjusts the relation between *work* and *is* in the example mentioned, as opposed to **He has working now*.

Third, inflectional morphemes are morphologically general, or productive. Thus almost every English verb has *-ed* and *-ing* forms, whereas **country-al*, **desk-al* do not exist in derivations.

Fourth, inflectional morphemes are at the margins of words, outside of derivational morphemes. Note the relative positions of inflectional [PL] form *-s* and derivational *-ment* in *govern-ment-s* vs. **govern-s-ment*.

The above characteristics are by no means exhaustive, but all follow naturally from our characterization of the distinction. Since IM is syntactically relevant, or called for by syntactic rules, inflectional morphemes should not change the syntactic category, which would otherwise destroy the construction. They may mark the syntactic relationship in government or agreement between words. IM is productive simply because the syntactic rules they have access to are structurally general. An inflection always closes a word, because of the fact that lexical insertion into syntactic structures depends on a full range of lexical properties on an item: thus derivational operations must all be completed before the lexical insertion. It is only after lexical insertion that inflectional rules apply, determining morphosyntactic representations (Anderson 1988).

It should be noted before proceeding that those characteristics differentiating DM from IM do not always go together. For instance, the comparative and superlative inflections *-er* and *-est* lack generality (Zwicky 1989), as in *small-er* and *small-est* vs. **useful-er* and **useful-est*. In contrast, the derivational *-ly* which makes an adverb from an adjective is a productive suffixation, as in *happi-ly*, *careful-ly*, *large-ly* etc. What we must bear in mind for our discussion of the Chinese DE below, though, is its syntactic relevance of IM.

## 4. The Resultative DE

There are several homophonous *de*'s in Chinese. C.-R. Huang (1989 and references therein) gives a succinct survey of their distributions and typology. Here, we are investigating only the resulative DE, as compared with the adjectival *de* and adverbial *de*. Below we revise the relevant part of C.-R. Huang's typological list.

(1) a. An adverbial affix:
Ta jingchang-de chi dao.
he habitually -de late arrive
'He comes late habitually.'

b. An adjectival clitic:
zoutian lai de ren
yesterday come de person
'the person who came yesterday'

c. A verbal clitic:
Ta [$_{VP}$ [$_{V1}$ ku DE][$_{VP2}$ hen shangxin]]
he cry DE very hurt-heart
'He cries sadly.'

We will argue that DE in (1c) is an inflectional morpheme, in contrast to the adverbial *de* in (1a) and adjectival *de* in (1b), which will be shown to be words. More examples of DE and *de* are given below, with the resultative DE in (2) and (3), the adjectival *de* in (4), and the adverbial *de* in (5).

(2) Ta [$_{VP}$ [$_{V1}$ tiao-DE][$_{V(P)2}$ kuai]].
he jump DE fast
'He jumps fast.'

(3) Ta $[_{VP}$ $[_{V1}$ han-DE$]$$[_{S}$ sangzi dou ya le$]]$.
he shout DE throat all mute perf.
'He shouted so much that his voice was getting mute.'

(4) Wo zai kan zoutian mai de shu.
I at look yesterday buy de book
'I am reading the book bought yesterday.'

(5) Ta da sheng de chang ge.
he big sound de sing song
'He sang loudly.'

Several notes are in order here. First, (1c) and (3) are traditionally referred to as a "resultative complement construction" because what V(P)2 in (1c) denotes comes as a result of what V1 denotes. Second, VP2 after DE as in (1c) can be replaced by a clause (S), as in (3). Third, (2) is traditionally referred to as a "descriptive complement construction" in that VP2 describes V1. Actually, VP2 is a prototypical adjective phrase (AP) in (2). APs like *hen lei* 'very tired' can also replace VP2/S in (3). There seems to be no problem representing such categorial overlapping here, for we can use [+V] to refer to both adjectives and verbs, and use $V^2$ for both VP and S, either use being common in linguistic practice. For convenience, we will use DE in (1c), (2) and (3) and call them all the resultative (henceforth R-) construction, as opposed to *de* for adjectival or adverbial markers in (1a), (1b), (4) and (5), the non R-constructions.

The status of DE has been controversial: it is treated as a particle word in the Sinologist literature, as a COMP introducing VP2 or S in C.-T. Huang (1982) and Ross (1984), as a clitic to the preceding verb in C.-R. Huang (1989), or implicitly assumed as a derivational suffix to the verb in C.-R. Huang & Manjione (1985) and C.-T. Huang (1988). In order to argue for DE as an inflectional morpheme, the burden on us is to show that a) it is not a word but a bound morpheme, b) it is not a COMP, c) it is not a clitic, d) it is not a derivational affix, but an inflectional affix with syntactic relevance.

## 5. DE Is Not a Word but a Bound Morpheme

Obviously DE cannot be a word of major syntactic category defined in terms of [N] or [V]. But can it possibly be a grammatical function word like the English prepositions *in*, *over* or *under*, or determiners *a* or *the*, or COMP *that*, and so on? Whether DE is a word at all depends on the definition of word. Unfortunately, WORD is not a unified construct throughout grammar (Dai 1990a and references there), and we need at least two notions, namely, SYNTACTIC WORD and PHONOLOGICAL WORD in grammar. For instance, *cat's* in (6b) contains two syntactic words, parallel to *cat is* in (6a).

(6) a. The cat is going to eat.
b. The cat's going to eat.

In phonology, however, *cat's* is one word, evidenced by the word-internal sandhi: *s* in *cat's* is voiceless, as opposed to *s* in *cat is*, which is voiced. The phonological rule of devoicing applies within a word, the same domain as the voicing alternations of the PL *-s*, and POSS *-'s* and PRES 3 SG *-s*. Thus *cat's* is one phonological word but corresponds to two syntactic words. Therefore, we define PHONOLOGICAL WORD as a prosodic domain for the application of certain phonological rules, and SYNTACTIC WORD as the minimal rank syntactic rules refer to, e.g., *'s* in (6b) and *is* in (6a) are both syntactic words, since they are the minimal rank the rule VP --> AUX VP refers to, and *is* is also crucially referred to in the yes-no question, giving *Is the cat going to eat*?.

Back to our case, we are interested in whether DE is a syntactic word. Suppose that DE is called for by the syntax. This is true since (1c), (2) and (3) would be ungrammatical without DE. But this is not a sufficient condition on word, although it is a necessary one, for we know that inflectional morphemes are also required by the syntax. So in addition to being referred to by syntactic rules, syntactic tests should be used for a resolution. For instance, a word could be a minimum free form. But the syntactic freedom test may not work in every case, for English prepositions, determiners and COMP cannot occur alone syntactically, but they are words. However, these function words can pass the EXPANSION test. A word can be inserted between two words but not between two morphemes within one word. In this paper, we assume that for an item to qualify as word, another syntactic word can be inserted on both its right and its left side. For instance, *in-* in *incorrect* is not a word because no word can be inserted on its right side, e.g., **in-absolutely-correct* (cf. *absolutely incorrect*). But *in* in *They sat in chairs* is a word because some syntactic words can be inserted on both sides, giving *They sat comfortably in big chairs*.[1]

DE is not a syntactic word because, although words can be inserted on its right side, it fails with regard to left syntactic expansion, i.e., no word may intervene between DE and the preceding verb, as in (7) and (8), which is expanded from (2) and (3) repectively.

(7) a. *Ta tiao sheng-DE kuai. (left expansion)
he jump rope [rope-skipping] DE very high.

b. Ta tiao-DE hen kuai. (right expansion)
he jump DE very fast.
'He jumps very fast.'

(8) a. *Ta han ren-DE sangzi dou ya le. (left expansion)
he shout person DE throat all mute perf.

b. Ta han-DE ta de sangzi dou ya le. (right expansion)
he shout DE he de throat all mute perf.
'He shouted so much that his voice was getting mute.'

In contrast, syntactic expansion can apply to *de* in (4) and (5) on both sides, as in (9) and (10), which demonstrate that the *de*'s are syntactic words in our framework.

---

[1] Admittedly, the various tests for wordhood are language-specific, and we refer the interested readers to Dai (1990a) for the relevant tests in different languages. In addition, the tests may be structure-specific. For instance, no word may easily intervene between *just* and *because* in *just because he is sick* (Yong-kyoon No, p.c.), but *just* and *because* are syntactic words in English.

(9) a. Wo zai kan zoutian mai gei meimei de shu. (left expansion)
I at look yesterday buy to younger-sister de book
'I am reading the book which was bought to my sister yesterday.'

b. Wo zai kan zoutian mai de gang chuban de neiben shu. (right expansion)
I at look yesterday buy de just publish de that book
'I am reading the book bought yesterday which had just been published.'

(10) a. Ta da sheng bu ting de chang ge. (left expansion)
he big sound not stop de sing song
'He kept on singing loudly.'

b. Ta da sheng de shi-zhe chang ge. (right expansion)
he big sound de try prog.sing song
'He was trying to sing loudly.'

Now we conclude from the expansion test that whereas the *de*'s are words, DE isn't a word, but a bound morpheme.[2] This entails that DE cannot be a particle word in the traditional sense.

## 6. DE Is Not a COMP

Given its non-word-hood, the view on DE as a COMP should be discarded in the first place, for a "standard" COMP (as *that* in English) is a word. There are additional reasons for DE not to be a COMP. (11) would be the structure if DE is a COMP, comparable with the COMP position in English in (12).

(11) Ta han [$_{S'}$ [$_{COMP}$ DE]] [$_S$ sangzi dou ya le]].
he shout DE throat all mute perf.
'He shouted so much that his voice was getting mute.'

(12) We thought [$_{S'}$ [$_{COMP}$ that] [$_S$ he was a good student]].

---

[2] One potential problem for this claim is the apparent missing DE in coordination in (iii). If (iii) involves a syntactic deletion, then DE must be a word, otherwise the Principle of Morphology-Free Syntax would be violated (cf. section 8). Several possible accounts for the missing DE come to mind, though we won't discuss them here: a) It results from the bisyllabic rhythm rule in the language (Dai 1990b). b) It is not the R-construction, but involves one of the other *de*'s. c) There are circumstances in which affixes can be missing, such as *-men* (the plural marker) in (iv).

(i) Ta pao-DE tiao-DE kuai. (ii) *Ta pao- tiao-DE kuai.
he run DE jump DE fast
'He runs fast and jumps fast.'

(iii) ?Ta pao- he ('and') tiao-DE kuai.

(iv) xuesheng-men he laoshi-men --> xuesheng- he laoshi-men
student PL and teacher PL student and teacher PL

The English COMP *that* in (12) forms a syntactic and a phonological constituent with the following S it introduces. The topicalization of S plus COMP in (13a) confirms the syntactic constituency, and the ungrammaticality of (13b) suggests that the COMP should be phonologically phrased with S. This is confirmed by (13c) and (13d), where a parenthetic remark can be inserted before, but not after, the COMP. The latter results in a phonological discontinuity.

(13) a That he was a good student, we thought.
b *He was a good student, we thought that.
c We thought, well, that he was a good student.
d *We thought that, well, he was a good student.[3]

In contrast with (12) and (13), the structure in which DE is in COMP in (11) runs counter to the fact that DE phonologically leans on the preceding constituent (verb), rather than on the following like English *that*. (11) is also contra the observation that DE forms a morphosyntactic constituent with the preceding verb. Although the topicalization in (14b) might sound unnatural, it contrasts sharply with the ungrammatical (14c) where DE is also fronted. In addition, a parenthetic remark can intervene only after, but not before, the DE, as in (14d) and (14e). All of these pieces of evidence argue for the structure in (14a) which is repeated from (3), and against the structure of (11) where DE is in COMP. Therefore, we come to the conlusion that DE is not a COMP.

(14) a Ta [$_{VP}$ [$_{V1}$ han-DE]][$_{S}$ sangzi dou ya le]].
b ?Sangzi dou ya le, ta han-DE.
c *DE sangzi dou ya le, ta han.
d Ta han-DE, hmn, sangzi dou ya le.
e *Ta han, hmn, -DE sangzi dou ya le.

## 7. DE is Not a Clitic

Provided that DE is a bound morpheme, there are still two possiblities for its grammatical status: a clitic and an affix. Here we adopt Zwicky's (1985a) metacriterion. In the absence of clear evidence classifying an item one way or the other, we should assume the item to be an affix (or a word). The implicit claim about the general human ability for language is that clitics are more marked than inflectional affixes (or words).

There are two sorts of phenomena which are discussed under the term clitics:[4] "phrasal affix", e.g., the English possessive *'s* in *the cat's house*, which is distributed by the syntax, realized on the last word of the NP, and "bound word", e.g., the reduced AUX in English, such as the syntactic word *'s* in *The cat's going to eat*. In a restrictive theory of clitics (such as that in Nevis 1988), clitics are only those items that phonologically interact with the hosts. Phrasal affixes and bound words phonologically interact with their hosts within phonological words, evidenced by the voicing assimilation, and hence are clitics. Otherwise, items default to "leaners", those syntactic words which are prosodically dependent on the hosts, like English determiners, infinitive *to*, etc.

---

[3] Joseph (p.c.) points out that (13d) seems fine to some speakers. However, for these speakers, a grammaticality contrast remains between (i) and (ii).

i. We thought, as long as you're asking, that he is a good student.
ii. *We thought that, as long as you're asking, he is a good student.

[4] For a summary on this topic, see Nevis (1988) and references therein.

It is known that DE is prosodically weak, since it is unstressed and toneless. But unstressed items are not necessarily clitics. For instance, prepositions, determiners, and AUX's in English are usually unstressed, but they are words or leaners; and there are clitics which have contrastive stresses. Being toneless is not unique to clitics either. The plural marker *-men* is toneless in Chinese, but it is a word suffix. So the emphasis on the phonological (rather than prosodic) interaction of an item with its host serves to restrict the number of clitics in the theory, hence consistent with the metacriterion of markedness in Zwicky (1985a).

There is no evidence whatsoever for DE phonologically interacting with the preceding verb. In particular, it does not participate in word internal tone sandhi, vowel harmony, voicing assimilation, etc., all of which are found in other languages. Thus DE is not a clitic but defaults to an affix in our framework. Moreover, affixhood is supported by its high degree of selection on hosts, one of the six symptoms differentiating affixes from clitics (Zwicky & Pullum 1983): the host of DE must be a [+V] category (prototypically verbs or adjectives), as in (15). In contrast, the other *de*'s, which may lean on some of the [-V] categories,[5] exhibit a low degree of selection instead, as in (16).

(15) a. [+V] hosts

| | | | |
|---|---|---|---|
| pao-DE kuai | zou-DE dong | liang-DE yao yan | kun-DE yao ming |
| run fast | walk move | bright strike eye | tired want die |
| 'run fast' | 'able to walk' | 'too bright for eyes' | 'tired to death' |

b. [-V] hosts

| | | | |
|---|---|---|---|
| *yu-DE da | *yifu-DE hao kan | *cong-DE yuan | *zai-DE gao |
| rain big | clothes pretty | from far | at high |

(16) a. [+V] hosts

| | | | |
|---|---|---|---|
| pao de dong | zuo de yangzi | liang de xing | kun de mianrong |
| run action | walk posture | bright star | tired face |
| 'action of run' | 'posture of walk' | 'bright star' | 'tired face' |

b. [-V] hosts

| | | | |
|---|---|---|---|
| ya yu de rizi | yifu de yangzi | *cong de zou | ?zai de keneng |
| down rain day | clothes look | from walk | at possiblity |
| 'rainy day' | 'look of clothes' | | |

In sum, DE is not a clitic but an affix by the metacriterion of markedness, since there is no phonological evidence for its clitichood. Also we have shown that DE exhibits a high degree of selection on its host, like affixes.

---

[5] They cannot happily lean on prepositions in Chinese, as in (16b).

## 8. DE Is an Inflectional Morpheme

We now will argue that DE as an affix must be analyzed as an inflectional morpheme, rather than a derivational morpheme. C.-R. Huang & Mangione (1985) take the position that DE is affixed to the preceding verb, but they assume that the rule of affixation operates in the lexicon, which entails taking it to be a derivational morpheme. In this approach, DE-verbs would be separate lexical items related to the source word verbs as in (17a), just like the garden variety derivational operations, as in (17b-c).

| (17) | SOURCE WORD | OPERATIONS | DERIVED WORD |
|---|---|---|---|
| a. | Verb: tiao 'jump' | DE-suffixation | Verb: tiao-DE 'jump (?)' |
| b. | Noun: ren 'person' | Men-suffixation | Noun: ren-men 'persons' |
| c. | Verb: ai 'love' | Ke-prefixation | Adj.: ke-ai 'lovable' |

Since derivational rules are independently needed in the language, then what is the problem with treating verb-DE as a derived lexical item? We believe that such an approach threatens another fundamental assumption of linguistic theory we adopt here, the Principle of Morphology-Free Syntax (PMFS) (Zwicky 1987 and references therein), also known as the lexicalist hypothesis. The PMFS states that syntax is blind to morphology, i.e., syntactic rules cannot make reference to the internal morphological composition of words or to the particular rules involved in their morphological derivation. We will argue that (17a) in effect stipulates not a derived V-DE, but a feature [+R(ESULTATIVE)], which is required by the syntax. And this stipulation violates the PMFS.

The derivational rule in (17a) must stipulate [+R], since it has to allow the derived V-DE in the syntactic environment in (18), while disallowing it in (19), if we want a correct syntactic description of Chinese.

(18) a. Ta tiao-DE kuai. (*Ta tiao kuai.)
he jump DE fast
'He jumps fast.'

b. Ta chang-DE hao ting. (*Ta chang hao ting.)
he sing-DE good hear
'He sings pleasantly.'

c. Ta chao-DE women shui bu zhao.(*Ta chao women shui bu zhao.)
he make-noise DE we sleep not sound
'He made such a big noise that we couldn't get into sleep.'

d. Ta jidong-DE shuo bu chu hua.(*Ta jidong shuo bu chu hua.)
he be-moved speak not out expression.
'He was so moved that he couldn't speak.'

(19) a. *Ta tiao-DE sheng.
(Ta tiao sheng.)
he jump rope
'He played rope-skipping.'

b. *Ta tiao-DE zai ma shang.
(Ta tiao zai ma shang.)
he jump at horse up
'He jumped down onto the horse.'

Thus the facts in (18) and (19) point in the other direction: the presence or absence of DE is determined by individual syntactic constructions.

Let us propose that [+R] is a constructional feature, and the R-construction sets up three stipulations: its first immediate constituent must be a bare verb (V1), and the second must be XP (or S) which is a [+V] category, and V1 must take the DE-form. All the three requirements are met in the good sentences in (18), and the bad ones are due to the missing DE. On the other hand, the sentences in (19) are unacceptable since the XPs are [-V] categories, i.e., a NP in (19a) and a PP in (19b). Without DE, they are fine, because the construction is then [-R].[6]

Coordinate structure facts support [+R] as a constructional feature. The VP marked by [+R] cannot be happily conjoined with other predicate VP constructions, say, the verb-object construction or the intransitive VP, which default to [-R], as in (20). Assuming each VP conjunct must have the same feature with respect to [R], the status of (20) then would have an explanation. (20b) is not acceptable, since the last VP conjunct bears [+R], whereas the rest default to [-R]; (20a) has no such feature conflict.

(20) a. Xiao niao fei, jiao, zhuo chong.
little bird fly sing catch worm
'Little birds fly, sing and catch worms.'

b. ?/*Shao niao fei, jiao, zhuo chong, tiao-DE kuai.
little bird fly sing cat worm jump DE fast

Back to the derivational rule in (17b) again, with respect to the syntactic feature [+R] assigned to (17a). (17b) derives some "plural" ([+PL]) nouns or pronouns in Chinese. [+PL] is no doubt a semantic feature; but it is by no means a syntactic feature in Chinese, for we know of no evidence showing that any syntactic constructions requires the presence of [+PL] on nouns, say, like number agreement in English. Therefore it is not a syntactic feature; syntax is blind to it, thus obeying the PMFS. The same is true of (17c). In contrast, the derivational rule (17a) imposes [+R] on its derived form. And as argued above, this feature must be understood syntactically; the PMFS is violated, since syntax has access to the particular rule involved in the morphological derivation.

---

[6] While the (un)grammaticality in (18) can be accounted for on syntactic grounds, one may argue that (19) is ruled out by the incompatibility in lexical semantics between *tiao*-DE and its complement, and hence (19) is syntactically irrelevant. Our position however is that any syntactic construction must be associated with, among other things, its semantic interpretation and pragmatic value. As mentioned earlier, in the R-construction, V(P)2 is required to be understood as the result of, or the description of, V1. In addition, the ungrammaticality of (19b) cannot be due to the semantics and pragmatics only, since there is no reason as to why PP *zai ma shang* cannot denote the result of V1 (cf. the string in the parenthesis in (19b)). Therefore (19b) is indeed ruled out by the syntax: either the presence of DE or the PP after V1, or both. The same point can be made for the data in (15) and (16).

We have seen that V-DE cannot be derived in the lexicon, and hence DE is not a derivational morpheme, with respect to the PMFS. DE must be an inflectional morpheme, even for those who don't adopt the PMFS, for the syntactic relevance of DE has been well demonstrated.

## 9. Some Consequences

There are some consequences following our analysis of DE as an inflectional morpheme. Empirically, the characteristics of DE fall out naturally. DE can be suffixed to virtually every verb (-- productivity); V1-DE in the construction is still a verb (-- no change in parts of speech); DE closes the word (verb) and thus goes after derivational morphemes within the word (-- marginal position).

Our analysis also bears on the hotly-debated theoretical issue as to whether V1 or V(P)2 is the head or main verb in the R-construction (C.-T. Huang 1988 and references therein). A resolution cannot be made effectively on semantic grounds. The translation in (2), for instance, shows that V1 is the head, but the translation might just as well be *He is fast in jumping*, where VP2 is treated as the main verb. On the basis of syntax, however, the head of the matrix VP in (2) must be V1 in our analysis, rather than V(P)2. Following Zwicky (1985b), the notion of head in syntax is for the percolation of syntactic features relevant to the external syntax of the construction, and the head is where the morphosyntactic locus is found in the construction. For example, the following are the heads the inflection attaches to in the construction: N in Det + N (*the student-s*), V in V + NP (*build-s the house*), AUX in AUX + VP (*was going to school*), etc.[7] This is on a par with our case. In the R-construction, V1 is the head, since it is V1, not V2, that is obligatorily inflected with DE by percolation of [+R] from the matrix predicate VP, i.e., V1 is where the morphosyntactic locus of [+R] is realized in the construction.

Another theoretical controversy in the literature is the constraints on Chinese phrase structure. Our analysis entails a subcategorization frame at the $V^0$ level: the head V subcategorizes for a [+V] phrase. Such a subcategorization in turn sheds light on the Chinese Phrase Structure Constraint proposed by C.-T. Huang (1982), which is stipulated to rule out the co-occurrence of a resultative phrase and an NP object following a verb, as in (21c) and (21d). In our framework, however, such a stipulation is no longer needed in the grammar, given the assumption that an NP object is also subcategorized for at this level and that the default is for Chinese phrase structures to be binary branching.

(21) a. Ta tiao-DE hen kuai.
he jump DE very fast.
'He jumps very fast.'

b. Ta tiao sheng.
he jump rope
'He plays rope-skipping.'

c. *Ta tiao-DE hen kuai sheng.
he jump DE very fast rope

d. *Ta tiao-DE sheng hen kuai.
he jump DE rope very fast

---

[7] Note that AUX in AUX + VP (*was going to school*) is the head because *was* is where the morphosyntactic locus is found for the matrix construction: tense, finiteness and agreement features for the external syntax (so *-ing* in *going* is irrelevant in this regard).

## 10. Concluding Remarks

We have demonstrated in this paper that DE is an inflectional morpheme rather than a particle word, a COMP, a clitic, or a derivational affix. We hope that the investigation would enlighten linguists about inflectional morphology in Chinese. Of course, the result is contra the traditional expectation, as Chinese is well known for being among the most isolating or analytic languages of the world. It is further suggested that inflectional morphology might be more widely spread than is usually supposed. We have eliminated one example of a language without inflection, which should encourage interested linguists to examine other cases to see whether they exhibit the same behavior as the DE studied in this paper.

## REFERENCES

Anderson, Stephen R. 1988. Morphological theory. In Frederick J. Newmeyer ed., Linguistics: The Cambridge Survey Vol.I. 146-191. Cambridge: Cambridge University Press.

Chao, Yuen Ren. 1968. A Grammar of Spoken Chinese. Berkeley & Los Angeles: University of California Press.

Dai, John Xiang-ling. 1990a. Historical morphologization of syntactic structures: Evidence from derived verbs in Chinese. Diachronica VII:1.9-46.

Dai, John Xiang-ling. 1990b. Some issues on A-not-A questions in Chinese. Journal of Chinese Linguistics 18:2.285-316.

Huang, Chu-Ren. 1989. Cliticization and Type-Lifting: A Unified Account for Mandarin NP *de*. Bloomington: Indiana University Linguistics Club.

Huang, Chu-Ren. & Louis Mangione. 1985. A reanalysis of de: Adjunct and subordinate clauses. Proceedings of the Fourth West Coast Conference on Formal Linguistics.80-91.

Huang, C.-T. James. 1982. Logical Relations in Chinese and the Theory of Grammar. MIT dissertation.

Huang, C.-T. James. 1988. *Wo Pao De Kuai* and Chinese phrase structure. Language 64:2.274-311.

Joseph, Brian D. & Richard D. Janda. 1988. The How and Why of Diachronic Morphologization and Demorphologization. In M. Mammond & M. Noonan eds., Theoretical Morphology.193-210. Orlando: Academic Press.

Li, Charles N. & Sandra A. Thompson. 1981. Mandarin Chinese: A Functional Grammar. Berkeley: University of California Press.

Nevis, Joel. 1988. Finnish Particle Clitics and General Clitic Theory. Outstanding Dissertation in Linguistics, Garland Publishing Co.

Ross, Claudia. 1984. Adverbial modification in Mandarin. Journal of Chinese Linguistics 12.207-234.

Zwicky, Arnold M. 1985a. Clitics and particles. Language. 61:2.283-305.

Zwicky, Arnold M. 1985b. Heads. Journal of Linguistics 21.1-29.

Zwicky, Arnold M. 1987. Slashes in the passive. Linguistics 25.639-669.

Zwicky, Arnold M. 1989. Quicker, more quickly, *quicker. Yearbook of Morphology 2.139-173.

Zwicky, Arnold M. & Geoffery K. Pullum. 1983. Cliticization vs. inflection: English N'T. Language 59:3.502-513.

ESCOL '90 79-89

# AGAINST AN ERGATIVE ANALYSIS OF EASTERN JAVANESE*

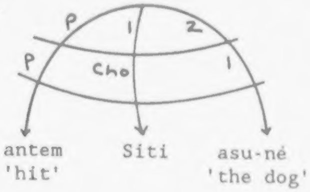
William D. Davies
University of Iowa

Much recent work on Austronesian focuses on the issues of syntactic ergativity and/or the appropriateness of a passive analysis of certain constructions, e.g., De Guzman (1988), Durie (1988), Gerdts (1988), Hopper (1988), Verhaar (1988). Verhaar (1988) suggests in passing that Javanese is ergative. Today I present evidence against this position, arguing that data from sentence-level coordination, various control relations, and other factors favor a passive analysis of a sentence such as (1a), regardless of its function or "most natural" translation in certain discourse contexts.

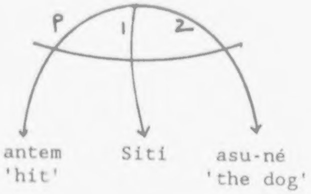
(1) a. Asu-né di-antem (karo) Siti.
dog-DEF DI-hit by S
'The dog was hit by Siti./Siti hit the dog.'

I will compare the descriptive power of a particular Passive Analysis (PA) of a clause such as (1a), given in (1b), with the so-called Ergative Analysis (EA), in which (1a) is a simple transitive clause, as diagrammed in (1c).

(1) b.


P
1
2
P
Cho
1
antem
'hit'
Siti
asu-né
'the dog'

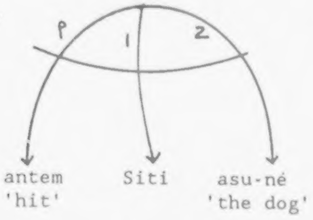
c.


P
1
2
antem
'hit'
Siti
asu-né
'the dog'

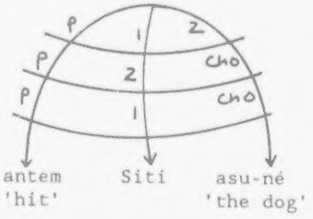
Now consider the sentence in (2a), an example of what is usually called an 'active clause' (Bintoro 1980, Suharno 1982).

(2) a. Siti ng-antem asu-né
S ACT-hit dog-DEF
'Siti hit the dog.'

b.


P
1
2
antem
'hit'
Siti
asu-né
'the dog'

c.


P
1
2
P
2
Cho
P
1
Cho
antem
'hit'
Siti
asu-né
'the dog'

Under the PA, (2a) is a simple transitive clause, given the structure in (2b). Under the EA it would be antipassive, as in (2c). Thus, under the Passive Analysis *di*- marks passives and the nasal prefix marks transitives, while under the Ergative Analysis *di*- marks transitives and *ng*- marks antipassives.

The antipassive analysis for (2a) follows Gerdts' (1988) convincing proposal for such an Ergative Analysis of Ilokano, a Philippine language, and parallels Verhaar's (1988) assertion that Indonesian is syntactically ergative.[1] Here I compare a particular Passive Analysis and a particular Ergative Analysis. These are syntactic analyses made precise in the framework of Relational Grammar. This is an important step because some previous assertions regarding syntactic ergativity have failed to make various aspects of the competing analyses explicit.

A number of generalizations about eastern Javanese that are statable in terms of final subjects in a PA shift to generalizations on final absolutives in the EA. For example, while only final subjects can be Equi controllees and little *pro* under the PA, only final absolutives would be eligible under the EA. Likewise, extraction is limited to final subjects under the PA, but would be limited to final absolutives under the EA. Finally, Javanese, a fairly canonical SVO language under the PA, would have an ABS-V-(ERG/other) organization under the EA.

Importantly, however, a number of generalizations that are fairly naturally stated under the PA are obscured under the EA. Interestingly, one of these involves a construction Verhaar (1988) takes to be criterial in establishing syntactic ergativity.

## 1. Sentence-Level Conjunction

In sentence conjunction, the preverbal NP of the second conjunct can be zero, its reference determined by an NP in the first conjunct. Which NP is a potential controller of this reference is more or less tightly constrained depending on the syntactic structure of the second conjunct.[2] I will consider here only those constructions which afford the widest range of possible controllers, since this actually is the only way to evaluate the differences in the two analyses.

At any rate, consider the following data.

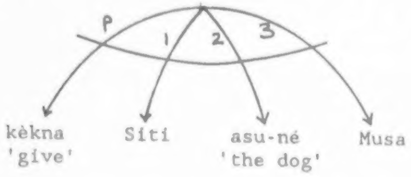
(3) Siti ngèkna asu-né nang Musa terus Ø di-nangis-na.
S ACT.give dog-DEF to M then DI-cry-CAUS
'Siti gave the dog to Musa and then she/it/he was made to cry.'

(4) Siti ngèki Musa asu-né terus Ø di-nangis-na.
S ACT.give.ADV M dog-DEF then DI-cry-CAUS
'Siti gave Musa the dog and then she/he/*it was made to cry.'

(5) Musa di-kèki asu-né karo Siti terus Ø di-nangis-na.
M DI-give.ADV dog-DEF by S then DI-cry-CAUS
'Musa was given the dog by Siti and then he/*she/*it was made to cry.'

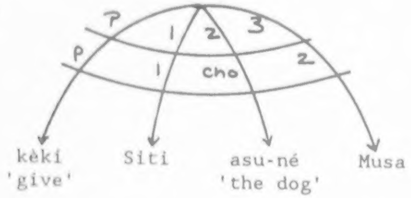
I will consider the data first in terms of the PA, and then in terms of the EA. Under the PA, the first conjunct of (3), is a simple transitive clause with the structure in (6).

(6)


P
1
2
3
kèkna
'give'
Siti
asu-né
'the dog'
Musa

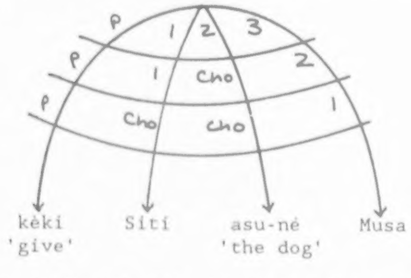
As the sentence in (3) indicates, any of the terms can control the reference of the missing element in the second conjunct. The first conjunct in (4) is a 3-2 advancement construction, as diagrammed in (7).

(7)


P
1
2
3
P
1
Cho
2
kèki
'give'
Siti
asu-né
'the dog'
Musa

In (4), only Siti (the final 1) and Musa (the final 2) can control reference. Asu-né 'the dog' is a chômeur and cannot control reference. Finally, in (5), only Musa, the final 1, is a possible controller. As (8), shows, in the first conjunct in (5), both asu-né 'the dog' and Siti are chômeurs, this clause having a 3-2 advancement and passive structure.

(8)

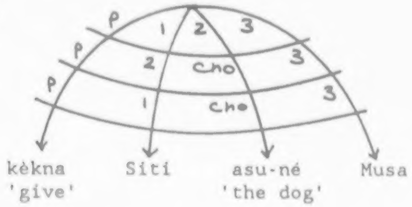

P
1
2
3
P
1
Cho
2
P
Cho
Cho
1
kèki
'give'
Siti
asu-né
'the dog'
Musa

Thus, it is possible to state the restriction on control of the zeroed NP of the second conjunct in terms of final term grammatical relations (1,2,3), as in (9), a fairly natural generalization.

(9) Only final terms (1, 2, and 3) may control anaphora in sentence-level conjunction.

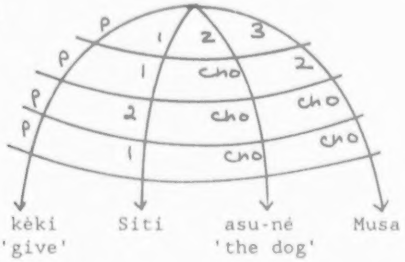
Turning to the EA of the same data, we find that things are somewhat more complicated. The first conjunct in (3) would have the antipassive structure in (10).

(10)



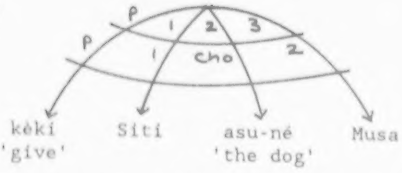
Under this analysis, a final absolutive (Siti), a 2-chômeur ('the dog'), and a final 3 (Musa) can all control reference. The first conjunct in (4) would presumably have a structure combining 3-2 advancement and antipassive, given in (11).

(11)



Here only the final absolutive and the first of two absolutive or 2-chômeurs can supply the reference of the missing NP. Already, it seems, we have run into a problem applying the EA to the data; that is, not all 2-chômeurs are eligible. However, example (5) makes clear that specifying linear order or immediate postverbal position cannot sort out which 2-chômeurs are possible controllers. The first conjunct in this example would be a simple 3-2 advancement clause, (12)--yet the 2-chômeur, asu-né 'the dog', is not a possible controller. Neither for that matter is the ergative, Siti.

(12)



Thus, a principled account seems unavailable here. The best one can say is that final absolutives, some 2-chômeurs, and final 3s can supply the identity of the missing NP in the second conjunct, a fairly unenlightening result.

## 2. Control into Adverbial Clauses

Control into adverbial clauses provides another data domain distinguishing the two analyses. Again, the PA provides a straightforward generalization where the EA does not. As described in Davies 1990, adverbial clauses introduced by subordinators such as *polaé* 'because', *waktuné* 'when', *supaya* 'so that', and so on may have a little *pro* element in preverbal position (under the Passive Analysis a little *pro* subject). This is illustrated in (13).

(13) Amir mlayu polaé kasèp.
A run because late
'Amir$_i$ ran because he$_i$ was late.'

In (10), the reference of the missing element is controlled by *Amir*. However, not all elements of the matrix clause are possible controllers. This becomes clear in the data in (14-16).

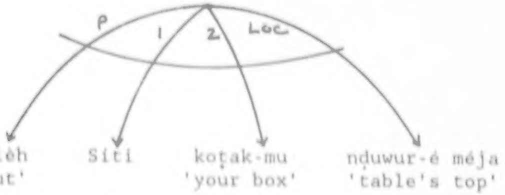
(14) Siti n-dèlèh koṭak-mu nang nḍuwur-é méja [polaé *pro*
S ACT-put box-your to top-DEF table because
abot/ kuat].
heavy/strong
'Siti$_i$ put your box$_j$ on the table's top$_k$ because it$_{j/*k}$/she$_i$ was heavy/strong.'

(15) Siti n-dèlèh-i nḍuwur-é méja koṭak-mu [polaé *pro*
S ACT-put-ADV top-DEF table box-your because
abot/ kuat].
heavy/strong
'Siti$_i$ put on the table's top$_k$ your box$_j$ because it$_{k/*j}$/she$_i$ was heavy/strong.'

(16) Nḍuwur-é méja di-dèlèh-i koṭak-mu karo Siti [polaé *pro*
top-DEF table DI-put-ADV box-your by S because
abot/ kuat].
heavy/strong
'On the table's top$_k$ was put your box$_j$ by Siti because it$_{k/*i}$/*she was heavy/strong.'

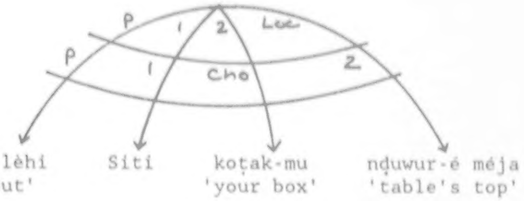
Under the PA, the matrix of (14) is a transitive clause with a locative argument flagged by a preposition, as in (17).

(17)


P
1
2
Loc
dèlèh
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

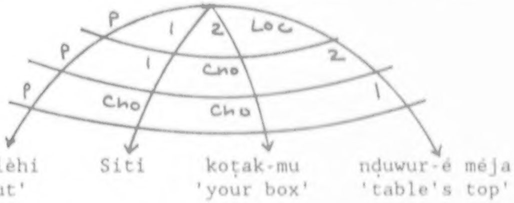
While for pragmatic reasons the most natural interpretation of the missing NP in the adverbial in (14) is koṭak-mu 'your box' (when the adverbial predicate is abot 'heavy'), Siti is also a possible interpretation, especially when the predicate of the adverbial is kuat 'strong'. However, under these circumstances, nḍuwur-é méja 'table's top' appears not to be a possible controller. In (15), the locative has advanced to 2, the advancement signalled by the -i suffix on the verb. Under the PA, the matrix has structure (18).

(18)


P
1
2
Loc
P
1
Cho
2
dèlèhi
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

Here the primary candidate for supplying the reference of the missing NP in the adverbial is nḍuwur-é méja, the advanced locative. Again, however, the final 1 (Siti) can control this reference. Finally, the matrix clause in (16) combines locative-2 advancement and passive, as diagrammed in (19).

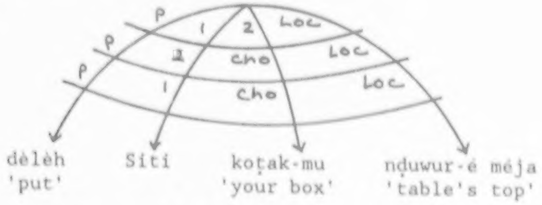
(19)


P
1
2
Loc
P
1
Cho
2
P
Cho
Cho
1
dèlèhi
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

Here the only possible controller of little pro is 'table's top', even though it would perhaps be more sensible pragmatically for koṭak-mu 'your box' to be the controller when the predicate is abot 'heavy'. What is crucial here though is that final nuclear terms are always possible controllers into adverbial clauses.

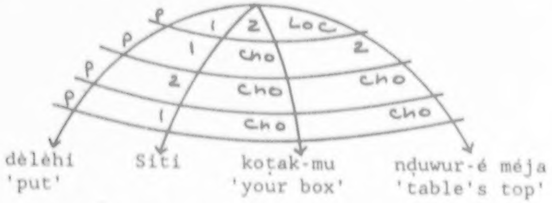
Under the EA, we find the same difficulty as before. The matrix clause in (14) would have the antipassive structure in (20); thus the final absolutive, Siti, and the 2-chômeur, koṭak-mu 'your box' can control.

(20)


P
P
P
1
2
1
2
Cho
Cho
Loc
Loc
Loc
dèlèh
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

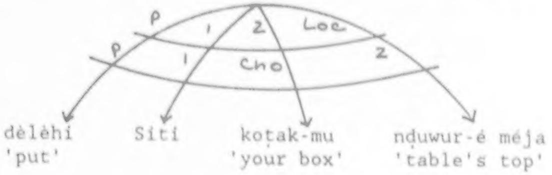
The matrix clause of (15) would combine locative-2 advancement and antipassive, as in (21).

(21)


P
P
P
P
1
1
2
1
2
Cho
Cho
Cho
Loc
2
Cho
Cho
dèlèhi
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

Here again the final absolutive (Siti) and the first of two 2-chômeurs (nḍuwuré méja) can control, but the second 2-chômeur is not a possible controller. Finally, in (16), the matrix clause would be a simple locative-2 advancement structure, (22).

(22)


P
P
1
1
2
Cho
Loc
2
dèlèhi
'put'
Siti
koṭak-mu
'your box'
nḍuwur-é méja
'table's top'

In this case only the final absolutive is a possible controller; the ergative (Siti) and the 2-chômeur (koṭak-mu 'your box') cannot control. Again, the EA is left with a somewhat less than straightforward statement on the condition of controllers--one that must distinguish among various types of 2-chômeurs. As we saw, the PA is again able to offer a straightforward constraint in terms of final grammatical relations.

Further evidence is available from control into finite subordinate clauses (which is restricted to final nuclear terms in the PA). However, space limitations do not permit detailed discussion of such data today.

## 3. Additional Evidence

There are other types of evidence that support the PA over the EA for eastern Javanese, although this evidence is of a different nature and perhaps less direct. First, there are some verbs that have no "*di*- form". Such verbs include *ngerti* 'understand', *mirip* 'resemble', and others. Under the PA, such verbs would be exceptions to the passive rule, exceptions that are perhaps rooted in the interaction of the syntax and semantics of Javanese. At any rate, lexical exceptions of this sort to a rule of passive are clearly not uncommon in the world's languages. Under the EA these verbs would uncharacteristically not occur in the ergative construction, but would obligatorily undergo antipassive. While such analyses have been proposed for various languages, given alternatives, the simpler grammar is the one ruling optional structure out rather than idiosyncratically requiring optional rules to apply.

Treatment of the "active" nasal prefix also bears on the issue. Under the Passive Analysis, this prefix occurs obligatorily on all "active" verbs in finally transitive structures (such as the verbs of (23), and many "active" intransitives (as in (24)).

| | | |
|---|---|---|
| (23) | *ngantem* | 'hit' |
| | *mbaca* | 'read' |
| | *ndelok* | 'look at' |
| | *ngirim* | 'send' |

| | | |
|---|---|---|
| (24) | *nangis* | 'cry' |
| | *ngguyu* | 'laugh' |
| | *njogèt* | 'dance' |
| | *netep* | 'remain' (purposely) |

The nasal prefix also occurs on all derived transitive verbs in finally transitive structures. Included in this final group are the verbs in (25).

| | | | | |
|---|---|---|---|---|
| (25) | *nyenengi* NP 'love NP' | from | *seneng karo*+NP | 'happy with NP' |
| | *nglungguhi* NP 'sit in' | from | *lungguh nang*+NP | 'sit in NP' |
| | *nglunyukna* 'make slippery' | from | *lunyu* | 'slippery' |
| | *nerangna* 'explain' | from | *terang* | 'clear' |

This final group of verbs is particularly revealing for our purposes. Under the passive analysis, the nasal prefix is added precisely because these verbs are finally transitive. The transitivity of the predicates is first signalled by the suffix *-i* or *-kna*, showing the increase in the valence of the base predicate. Although no exceptionless rule for the nasal prefix is available, under the PA it occurs obligatorily on the majority of finally transitive predicates.

Under the EA, the nasal prefix has a different description. The active verbs of (23) would be antipassives and the predicates of (24) active intransitives. Thus, active intransitives take the nasal prefix. The derived transitives of (25) would be antipassives of derived transitives. Thus, we would have to say that the nasal prefix marks "actives" that are finally intransitive and antipassives of derived transitives.

Where this becomes important is in the description of Javanese reciprocals. In Javanese, reciprocals are formed by reduplication of the bare stem and suffixation of -*an*. So we find data such as (26) and (27).

(26) a. Amir ng-antem Musa.
A ACT-hit M
'Amir hit Musa.'

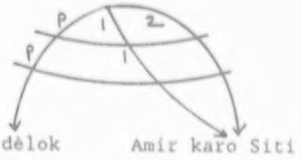
b. Amir karo Musa antemanteman.
A and M hit.REDUP.REC
'Amir and Musa hit each other.'

(27) a. Amir n-dèlok Siti.
A ACT-look.at S
'Amir saw Siti.'

b. Amir karo Siti dèlokdèlokan.
A and S look.at.REDUP.REC
'Amir and Siti saw each other.'

The question is how to account for the syntax of Javanese reciprocals. A plausible analysis within RG is multiattachment, followed by resolution of the multiattachment.[3] So (27b) would have the partial structure in (28), in which *Amir karo Siti* heads both an initial 1-arc and an initial 2-arc.

(28)



The net effect of the structure in (28) is detransitivization; that is, when the multiattachment is resolved in the second stratum, an intransitive structure is the result. Note that the lack of the nasal prefix is easily explained under the Passive Analysis if lack of this marking on notionally transitive verbs is associated with detransitivization. Thus, the lack of *ng*- on reciprocals receives the same explanation as the lack of *ng*- on volitional passives, non-volitional passives, and adversatives. Under the EA, however, the lack of *ng*- marking on reciprocals has no clear explanation, inasmuch as (28) is a detransitivizing structure, precisely where *ng-* is expected. Even granting some alternative analysis of reciprocals, the lack of *ng-* in this construction must be considered an idiosyncrasy of reciprocal formation.

## 4. Conclusion

While the syntactic data from conjunction and control make the strongest case, certain aspects of lexical exceptions to rules and verbal morphology also seem to weigh against the Ergative Analysis outlined here for eastern Javanese. The Passive Analysis consistently incorporates rule statements that reference only *final* grammatical relations of NPs and no others, a virtue of that analysis. Additionally, for those whose interest an Ergative Analysis of Western Austronesian languages appears to be motivated primarily by discourse considerations (cf. Verhaar 1988, Hopper 1988, Cooreman, Fox, and Givón 1988), examinations of texts reveal a very low incidence of the Javanese passive--a fact likely to discourage claims that Javanese is an "ergative language" in any currently accepted sense of the term.

## FOOTNOTES

*The data discussed here exemplify the familiar (Ngoko) speech of the dialect of Javanese spoken in Surabaya. Many thanks to my principal language informant Susanto Teng. Thanks also to Stanley Dubinsky for comments on an earlier version of this paper. Errors are mine alone.

1. Verhaar states that the Indonesian counterparts of the active clause in (2a) are sometimes "actives" and sometimes "antipassives".

2. Different syntactic constructions in the second conjunct yield different restrictions on anaphoric control. For example, when the second conjunct has a verb with the nasal (active) prefix, only the preverbal NP of the first conjunct can control reference, as in (i).

(i) Musa ng-antem Amir terus Ø mlayu menyang.
M ACT-hit A then run go
'Musa$_i$ hit Amir$_j$ and then he$_{i/*j}$ ran away.'

Likewise, when the second conjunct is a nonvolitional passive, only the preverbal NP of the first conjunct supplies reference.

(ii) Musa ngèkna asu-né nang Siti terus Ø ke-tabrak montor.
M ACT.give dog-DEF to S then PASS-hit car
'Musa gave the dog to Siti and then he/*it/*she got hit by a car.'

Under the PA only final subjects can control reference in these environments, while under the EA only final absolutives can control reference. These types of constructions thus provide no means for deciding between the two analyses under consideration here.

3. For discussion of the concept of multiattachment and the use of this construct to account for reciprocals and reflexives in various languages, see Berinstein 1985, Hubbard 1985, Perlmutter 1989, and Rosen 1988. Reflexives in Javanese are marked by a nominal construction in the expected syntactic position and the verb (if notionally transitive) takes the active prefix, as in (i).

(i) Siti karo Musa n-dèlok awak-é Déwé nang kaca.
S and M ACT-look.at body-DEF self in mirror
'Siti and Musa saw themselves in the mirror.'

## REFERENCES

Berinstein, A. 1985. Evidence for multiattachment in K'ekchi (Mayan). New York: Garland Publishing.

Bintoro. 1980. Javanese transitive verbs: a tagmemic grammar. NUSA volume 8.

Cooreman, A., B. Fox, and T. Givón. 1988. The discourse definition of ergativity: a study of Chamorro and Tagalog texts. In McGinn (ed.).

Davies, W. 1990. Chômeurs, control, and union in Javanese. Presented at the First Annual Meeting of the Formal Linguistics Society of Mid-America, University of Wisconsin, Madison.

De Guzman, V. 1988. Ergative analysis for Philippine languages: an analysis. In McGinn (ed.).

Durie, M. 1988. The so-called passive of Acehnese, Language 64.104-113.

Gerdts, D. 1988. Antipassives and causatives in Ilokano: evidence for the ergative analysis. In McGinn (ed.).

Hopper, P. 1988. How ergative is Malay? In McGinn (ed.).

Hubbard, P. 1985. The syntax of the Albanian verb complex. New York: Garland Publishing.

McGinn, R. (ed.) 1988. Studies in Austronesian linguistics. Athens: University of Ohio Press.

Perlmutter, D. 1989. Multiattachment and the Unaccusative Hypothesis: the perfect auxiliary in Italian. Probus 1.

Rosen, C. 1988. The relational structure of reflexive clauses: evidence from Italain.

Suharno, I. 1982. A descriptive study of Javanese. Pacific Linguistics Series D, number 45.

Verhaar, J. 1988. Syntactic ergativity in contemporary Indonesian. In McGinn (ed.).

ESCOL '90 90-101

# WHAT DETERMINES ANTIPASSIVE IN DYIRBAL?

Matthew S. Dryer
SUNY Buffalo

## *1. Introduction*

Just as the question arises what conditions active versus passive in English, the question arises in ergative languages with an antipassive construction what conditions the choice between basic and antipassive clauses. In this paper, I address this question with respect to the antipassive construction in Dyirbal, a Pama-Nyungan Australian language described by Dixon (1972). Example (1) illustrates a basic or ergative clause and (2) is a propositionally equivalent antipassive clause.[1]

| | | | | | |
|---|---|---|---|---|---|
| (1) | bala-n | ḍugumbil | ba-ŋgu-l | yaɽa-ŋgu | balga-n |
| | there,abs-nc$_2$ | woman,abs | there-erg-nc$_1$ | man-erg | hit-pres/past |
| | Man is hitting woman. (Dixon 1972: 65) | | | | |

| | | | | | |
|---|---|---|---|---|---|
| (2) | bayi | yaɽa | ba-gu-n | ḍugumbil-gu | balgal-ŋa-ɲu |
| | there,abs,nc$_1$ | man,abs | there-dat-nc$_2$ | woman-dat | hit-antipassive-pres/past |
| | Man is hitting woman. (Dixon 1972: 66) | | | | |

Superficially, the two constructions differ in that in ergative clauses, the A (transitive subject) occurs in the ergative case and the P (object) occurs in the absolutive case, while in antipassive clauses, the A occurs in the absolutive case and the P occurs in the dative or instrumental case. In addition, the verb in an antipassive clause bears an antipassive suffix. Dixon (1972) discusses a variety of syntactic differences between the two kinds of clauses that show that the two kinds of clauses differ not only in case marking but also in their syntactic structure. These differences involve syntactic properties associated with absolutive nominals which are associated with the P in an ergative clause, but with the A in an antipassive clause.

The issue addressed in this paper is the following discourse question: what determines the choice in Dyirbal between the use of an antipassive clause rather than its propositionally equivalent ergative clause? The claims of this paper are based on data in Cooreman (1988) and additional data which Cooreman has kindly provided me with, but I will argue for a rather different interpretation of this data from that proposed by Cooreman. The claim of hers that I will address here is not the primary thesis of her paper. The main purpose of her paper is to argue that the syntactic ergativity of Dyirbal does not reflect a discourse structure radically different from that found in syntactically accusative languages. She argues that A's in Dyirbal texts tend to be more topical than P's (just as they are in other languages), contrary to what some claims of others might be taken to imply, such as the characterization of the absolutive in Dyirbal by Mallinson and Blake (1981) as a "grammaticalized topic". I have no quarrel with this central claim of her paper and her evidence on this point seems quite convincing.

The claim of Cooreman's that I take issue with here is one she expresses in a number of similar ways in a number of places in her paper:

> "... the topicality of the objects [i.e. P's] in the antipassive ... is consistently lower than the topicality of the objects [P's] in the ergative construction." (p. 728)

> "... the -*ŋay* antipassive ... marks transitive propositions in which the referent of the objects [i.e. P's] on this minimized discourse level is new, hence low in topicality" (p. 730)
>
> "The antipassive ... can be characterized as a special construction marking the exceptionally low topicality of an object [i.e. P] in a transitive proposition ..." (p. 743)

I assume that these claims are to be taken as implying something like (3).

(3) The antipassive marks transitive propositions *as ones* in which the referent of the object [i.e. P] on this minimized discourse level is new, hence low in topicality.

While (3) is not logically entailed by Cooreman's claim, it is difficult to see the import of her claim if it is not intended. I will argue later in this paper that (3) is not the case. Cooreman's claim also appears to imply a weaker claim, that given in (4).

(4) The antipassive in Dyirbal is used when the P is low in topicality.

Thus Cooreman's claims seem to imply one hypothesis regarding the choice of ergative clause versus antipassive clause, that given in (5).[2]

(5) The antipassive in Dyirbal is used if and only if the P is low in topicality.

I will argue here against (5), arguing that there is no evidence that topicality *per se* plays any role in the choice of the antipassive construction. I will argue that there is in fact no evidence that discourse factors play any role in the determination of when antipassive is used in Dyirbal. In the first part of the paper I will specifically argue that discourse factors play no role, though I will retreat from this position somewhat in the latter part of the paper. One of my primary purposes is to illustrate a potential methodological problem with the topic continuity method of Givón (1983), which Cooreman uses to support her claims about the topicality of P's in antipassive clauses.

## *2. The referential distance of P's in antipassive clauses*

Cooreman's conclusions regarding the low topicality of P's in antipassive clauses in Dyirbal are based on a set of texts that included 313 clauses coding transitive propositions. 60 (or 19.2%) of these clauses were antipassive. Except for 14 false reflexive clauses (which resemble antipassives in a number of ways, but which I will ignore here), the remaining 239 clauses (making up 76.3% of the total) were ergative. Cooreman's conclusions regarding the low topicality of P's in antipassive clauses are based on results she obtained using the topic continuity measures of Givón (1983). Table 1 reorganizes data from Tables 2 and 3 in Cooreman's paper. The data for antipassive is based on 44 of the 60 antipassives in the texts she examined, excluding 16 antipassives where the P is unspecified. The data cited here involves just one text measure, referential distance (RD), the mean number of clauses back to a previous reference in the text, with a referential distance of 20 assigned to nominals without a previous reference in the preceding 20 clauses.[3]

Table 1
Mean Referential Distance[4]
(with number of tokens in parentheses)

| | A in ergative clause | A in antipassive clause | P in ergative clause | P in antipassive clause |
|---|---|---|---|---|
| Zero-anaphora | 1.30 (125) | 1.00 (42) | 1.27 (134) | 2.43 (7) |
| Noun marker | 1.44 (50) | ---- (0) | 3.92 (13) | 3.25 (4) |
| NP with noun | 11.26 (38) | 11.00 (2) | 10.59 (75) | 13.15 (33) |
| Overall | 3.45 (225) | 1.45 (44) | 5.19 (225) | 10.57 (44) |

Cooreman's evidence for her claim that P's are less topical in antipassive clauses than they are in ergative clauses is largely based on the overall mean referential distance figures for P's in the two kinds of clauses given at the foot of the last two columns in Table 1: the mean RD for P's in ergative clauses is 5.19 while the mean RD for P's in antipassive clauses is 10.57, showing that on the average, the distance back to a reference in an earlier clause is less for P's in ergative clauses than it is for P's in antipassive clauses. If we assume that referential distance is diagnostic to some extent of the topicality of a nominal, these figures do suggest that P's in antipassive clauses tend to be less topical than P's in ergative clauses. I will argue, however, that this effect is epiphenomenal.

### *3. The three uses of antipassive*

Cooreman herself notes that the 60 antipassive clauses fall into three subcategories: 16 of these antipassives involve unspecified P's (p. 728); 4 of them involve indefinite nonreferential P's; and the remaining 40 of them occur noninitially in what Dixon (1972) calls *topic chains*, sequences of clauses which form a single intonational unit and within which the syntax requires that, subject to a couple of systematic exceptions, the absolutive nominals in adjacent clauses be coreferential.

Let us consider each of these three uses of antipassive from the perspective of the question of what conditions the use of antipassive. Consider first the use of antipassive when the P is not specified, because its reference is unknown or irrelevant, as in (6).

(6) bayi yaɽa balgal-ŋa-ɲu
there,abs,nc$_1$ man,abs hit-antipassive-pres/past
Man is hitting (someone). (Dixon 1972: 70)

This use accounts for 16 of the 60 antipassives in the texts Cooreman examined. This use of antipassive is analogous to the use of passive in English when no by-phrase occurs, as in *John was killed.* Although antipassives like (6) clearly involve P's of low topicality, there is a critical difference between such uses of antipassive and ones for which there exists an ergative paraphrase. Since antipassives like (6) lack an ergative paraphrase, the use of antipassive in such contexts is, as Cooreman herself admits, obligatory. Hence such uses of antipassive are syntactically or semantically determined since there is no syntactic alternation to be determined by discourse factors. If this were the only use of antipassive in Dyirbal, we would just say that antipassive is used with transitive verbs when the P is unspecified, and there would be no reason to mention the low topicality of the object.[5]

Consider next the use of antipassive in clauses in which the P is nonreferential. There are 4 instances of this among the 60 antipassives in Cooreman's texts. Although Cooreman does not cite an example of this use, she explains (p.c.) that these involve a nonspecific P, as in English *He is looking for a wallaby,* where no particular wallaby is intended. Since such nonreferential P's apparently cannot be expressed by an absolutive in an ergative clause, the choice of antipassive in such instances is semantically determined. In other words, if the proposition the speaker wishes to express is one in which the P is nonreferential, then the antipassive must be used. Again, although the P in such cases is clearly of low topicality, there is no reason to appeal to a discourse notion of low topicality to explain them, since no discourse-governed alternation is involved.

These first two uses of antipassive both lack a propositionally equivalent ergative form and hence are not discourse-determined. If they were just extreme instances of a use of antipassive which in other instances was discourse-determined by low topicality, it might be appropriate to describe these as instances of a general category of clauses with a low-topical P. But as I will argue in discussing the third use of antipassive, there is no evidence that even this is the case.

The most common use of antipassive in the texts Cooreman examined (40 out of 60) involves noninitial clauses in topic chains, in which antipassive is used because the A is coreferential to the absolutive of the preceding clause, as in the second clause in (7) and the third clause in (8).

| | | | | |
|---|---|---|---|---|
| (7) | bayi | yaɽa | walma-ɲu | |
| | there,abs,nc$_1$ | man,abs | get.up-pres/past | |
| | bayi | ba-gu-n | ɖugumbil-gu | balgal-ŋay-gu |
| | there,abs,nc$_1$ | there-dat-nc$_2$ | woman-dat | hit-antipassive-purp |

The man got up to hit the woman. (Cooreman 1988: 729)

| | | | | |
|---|---|---|---|---|
| (8) | bulgan | bayi | wabu-ŋga | waymba-ɲu |
| | big,abs | there,abs,nc$_1$ | scrubs-loc | walk-pres/past |

The elder went out into the scrubs

| | |
|---|---|
| (Ø) | bilin-ɖa-ɲu |
| (abs) | climb-repet-pres/past |

climbing (all the trees)

| | | |
|---|---|---|
| (Ø) | ɖambu-ŋu | baɲil-ŋa-ɲu |
| (abs) | grubs-instr | split-antipassive-pres/past |

and chopping grubs

| | |
|---|---|
| (Ø) | ŋurba-ɲu |
| (abs) | return-pres/past |

then he returned home (Cooreman 1988: 732-733)

The antipassive is obligatory in the second clause in (7) and in the third clause in (8) in order to satisfy the requirement that absolutives in adjacent clauses within a topic chain be coreferential. If the second clause in (7) had not been antipassive, then the pronominal *bayi* (which refers back to *bayi yaɽa* 'the man', which functions as absolutive in the first clause) would have been ergative, thereby violating the requirement that absolutives in adjacent clauses must be coreferential. What this means is that if the A of a clause is coreferential to the absolutive in the preceding clause, the antipassive *must* be used, since only in antipassive clauses do A's occur in the absolutive case. Now since the syntax requires the use of the antipassive in these cases, it is again misleading to describe them as if the choice were discourse-conditioned. And there is certainly no basis for describing such cases as involving low topicality of the P, since in these contexts, antipassive must be used regardless of the topicality of the P.[6]

## *4. Two hypotheses compared*

Let us compare then two hypotheses regarding the use of antipassive in Dyirbal:

(9) Hypothesis A: Antipassive is used if and only if the P is of low topicality.

(10) Hypothesis B: Antipassive is used if and only if one of the following three conditions holds:
  a. the P is unspecified;
  b. the P is indefinite nonreferential;
  c. the clause is in a topic chain and the A is coreferential to the absolutive in the preceding clause.

Hypothesis A is what Cooreman's claims suggest. I will argue that Hypothesis B is the superior hypothesis. It follows from Cooreman's own data that Hypothesis B is observationally adequate, at least as an account of the data in the texts that she examined.[7] While Hypothesis A might seem to capture a generalization that is left unexpressed in Hypothesis B, I will argue that Hypothesis A fails at the level of observational adequacy.

Evaluating the predictions of Hypothesis A is somewhat hampered by possible lack of precision in the term *topic*. However, the problem with Hypothesis A is present regardless of one's notion of topic and can be illustrated by assuming, for the sake of argument, a simplistic notion of *topic*, defined simply in terms of referential distance (RD). In other words, let us suppose, for the sake of argument, a notion of *topic* such that referential distance is an accurate index of the topicality of a noun phrase. Then Hypothesis A claims that antipassive will be used when the RD is high but not when it is low. This is still vague, since it doesn't specify where the cutoff point is. But it is easy to see that there can be no cutoff point, no value *n* such that if the RD of the P is greater than *n* then antipassive is used but if the RD is less than *n* then the ergative is used. For, ignoring the first two uses of antipassive, when the P is unspecified or nonreferential, if the clause in question is in a topic chain, then whether antipassive is used or not depends entirely on whether the A of the clause was absolutive in the preceding clause. If the A was absolutive in the preceding clause, then antipassive is used, no matter how low the RD of the P is. Cooreman reports instances in which the P in an antipassive clause has a referential distance of 2. Thus, except for the absence of examples (in the texts Cooreman examined) of P's in antipassive clauses with an RD of 1, the full range of possible RD values for P's is attested. Nor, as discussed below, is there any reason to believe that there is any prohibition against antipassives in which the P has an antecedent in the preceding clause.

Conversely, if neither the A nor the P was absolutive in the preceding clause, then it will be necessary to start a new topic chain. And, at least in the texts Cooreman examined, antipassive is never used in the first clause of a topic chain (unless the P is unspecified or nonreferential). In such contexts, the ergative form will be used, even if the P has no previous reference in the discourse, and thus has an RD of 20. In short the RD of the P appears not to play any role in determining the choice of ergative versus antipassive.[8]

### *5. Explaining away Cooreman's evidence*

How then do we explain the evidence from Tables 1 and 2 that Cooreman cites in support of her conclusion regarding a relationship between the topicality of P's and the choice of ergative versus antipassive? If we examine the figures in these tables more closely, we find that this difference in RD between P's in the two kinds of clauses turns out to be a side-effect of the syntactic factors conditioning the use of antipassive. Cooreman herself notes that there are no instances in her data of a P in an antipassive clause with an RD of 1. On the other hand, it is very common for P's in ergative clauses to have an RD of 1, to have an antecedent in the immediately preceding clause; in fact it is possible to extrapolate from the data in Table 1 that at least 40% of P's in ergative clauses have an RD of 1. And the differences in the mean RD of P's in the two kinds of clauses appears to be largely if not entirely attributable to this difference in the distribution of P's with an RD of 1. The high frequency of P's with an RD of 1 in ergative clauses apparently reflects the nature of topic chains: if an ergative clause occurs noninitially in a topic chain then the P will necessarily have an RD of 1 since the P will be absolutive in the ergative clause and in order to satisfy the same-absolutive restriction within topic chains, the P would have to be coreferential to the absolutive in the immediately preceding clause. On the other hand, the infrequency of P's with an RD of 1 in antipassive clauses appears to simply reflect the fact that the number of situations where the syntax allows this to happen is highly restricted. Since antipassive clauses in which P's have antecedents in the discourse only occur noninitially in topic chains when the A is absolutive in the preceding clause, a P with an RD of 1 in an antipassive clause could only arise when both the A and the P have antecedents in the preceding clause, and the A is absolutive in the preceding clause and the P something other than absolutive, as in the hypothetical example in (11).

(11) man-erg$_i$ give woman-abs$_j$ stick-instr$_k$; Ø(abs)$_j$ throw-antipassive Ø(dat)$_k$
The man gave the woman a stick and she threw it.

I assume, from the fact that Cooreman found no instances of clauses like this in the body of texts she examined, that these situations arise infrequently.

In short, the fact that P's in ergative clauses have a lower mean RD than P's in antipassive clauses is attributable to the fact that P's in ergative clauses far more often have antecedents in the preceding clause, and the latter fact is attributable to the syntactic conditions on topic chains. Hence the higher mean referential distance of P's in antipassive clauses is a side effect of the syntactic conditions on the use of antipassive and ergative clauses and does not indicate that topicality plays any role in the choice of ergative versus antipassive. Hence we can conclude that Hypothesis A is inadequate as an answer to the question of what determines antipassive in Dyirbal.

In short, the differences in RD figures between ergative and antipassive clauses are explainable largely in terms of factors that have nothing to do with RD per se. This illustrates a potential risk in the topic continuity method: the data may appear to support a given hypothesis but be demonstrably explainable in other terms. The topic continuity method may be useful in examining syntactic alternations that are determined by discourse factors, but it is important that such counts be restricted to instances where there is discourse-conditioned alternation, and I have argued that none of the uses of antipassive in Dyirbal have this property.

### *6. A weakness in the argument*

Now there is one potentially serious weakness in the argument as presented so far. Even if the use of antipassive is required by the particular syntactic construction employed in these contexts, it remains possible that the choice of that other construction is itself partly determined by the topicality of the P. If such were the case, one might argue that the use of antipassive is conditioned, at least indirectly, by the topicality of the P. Nor need this conditioning be indirect. It might be that it is misleading from a discourse production point of view to say that the use of antipassive is determined by the choice of construction which requires it. It is possible that from a discourse production point of view, the topicality of the object is a direct causal factor in the choice of using an antipassive and that once that choice has been made, it becomes possible for the speaker to choose the construction which requires an antipassive. In other words, if the speaker had chosen to use an ergative clause instead, they would not have been free to use the construction that would have required an antipassive but would have had to use some other construction instead.

How plausible is this scenario in the present context? The constraints requiring coreferentiality of absolutives across clauses operate within the topic chains. In general, a text consists of a sequence of these topic chains, and the constraints on coreferentiality do not apply *between* topic chains, only *within* topic chains. Thus, between any two clauses, the speaker has, in a sense, a choice as to whether to continue the ongoing chain or to start a new one. One possibility is that these decisions are based entirely on thematic considerations, that the boundaries between clause chains reflect natural thematic boundaries and that the topic chains represent natural thematic units. If that is the case, then the fact that a clause with a semantic A coreferential to the absolutive in the preceding clause must be antipassive is forced by the fact that thematic considerations require that the clause in question be a continuation of the current clause chain. In other words, the thematic considerations would preclude the possibility of starting a new topic chain, which would have meant that antipassive would not have been required. Thus if boundaries between topic chains are determined entirely on the basis of such thematic considerations, then the choice of ergative or antipassive is determined on the basis of syntactic considerations, even though the particular syntactic construction is itself determined by discourse factors.

A second possibility, however, is that the decisions as to whether to continue a topic chain or start a new one are not based entirely on thematic considerations but are based partly on the topicality of the P. In other words, it is at least a logical possibility that if the P is more topical, then the ergative construction is used, in which case (in the contexts under discussion) it would be necessary to start a new topic chain, but that if the P is less topical, antipassive is used, thereby making it possible to continue the existing topic chain. If such a scenario were true one could maintain the view that the choice of antipassive is determined by the topicality of the P, even though the choice of antipassive within topic chains is syntactically determined. Unfortunately, the way Cooreman organizes her topic continuity data, there is no way to determine whether this is a possible way to view the situation.

Significantly, though, there is evidence in Cooreman's data that suggests that boundaries between chains are determined not only by thematic factors but also by the nature of coreference links across clause boundaries. The clauses in topic chains that require their absolutive to be coreferential to the absolutive in the preceding clause fall into two morphological subtypes, purposive constructions and what Cooreman calls coordinate constructions. The range of contexts in which the purposive construction is used is somewhat broader than what the name might suggest. It is used, not only in contexts where the relationship is one of purpose in the narrowest sense of the terms, where English would use an infinitive of purpose (*I got up to go uphill*), but also in contexts in which there is some sort of causal connection between the events of the two clauses. According to Dixon (1972: 68) the purposive is used if the event in the first clause is a necessary preliminary to the event in the second clause or if the event in the second clause is a natural consequence of the event in the first clause. Thus a sentence meaning *The man hit the woman and knocked her down* would occur in Dyirbal with a purposive in the second clause if the woman fell down as a consequence of the man hit hitting her (though I assume not if these were two independent acts). In the case of purposive constructions, the scenario discussed in the preceding paragraph seems somewhat unlikely, since these purposive constructions involve a strong thematic link between the two clauses. It is difficult to know for sure, however, without knowing more about the language and without examining texts.

On the other hand, the possibility that topic chain boundaries might be partly sensitive to factors like the topicality of the P is somewhat more plausible in the case of coordinate constructions since they do not involve the same thematic link. Table 2, which reorganizes some of the data in Cooreman's Table 7 (p. 739), provides evidence that suggests that decisions as to where to place boundaries between topic chains may be determined at least partly by the nature of coreference links between clauses.

Table 2[9]
Coreference Links Between Adjacent Clauses

| | coordinate within chain | between chains |
|---|---|---|
| S-S | *22 (88%)* | 3 (12%) |
| S-P | *16 (94%)* | 1 (6%) |
| P-S | *14 (93%)* | 1 (7%) |
| P-P | *7 (70%)* | 3 (30%) |
| S-A | 8 (36%) | *14 (64%)* |
| P-A | 2 (33%) | *4 (67%)* |
| A-A | 18 (46%) | *21 (54%)* |
| A-S | 9 (43%) | *12 (57%)* |
| A-P | 0 (0%) | *1(100%)* |
| A-A & P-P | *35 (88%)* | 5 (13%) |
| A-P & P-A | *2(100%)* | 0 (0%) |

The first four types in this table more often occur within chains. These are ones in which both nominals are S's or P's, what we might call semantically absolutive. The next five types more often occur across chain boundaries. These are ones in which at least one of the nominals is an A. The apparent generalization is that links in which both nominals are S or P occur more often within chains, other links occur more often across chain boundaries. The A-A & P-P type conforms to this since it occurs more often within chains, and it involves an P-P link. The last type does not conform (since there is no absolutive link, yet both are within clauses) but there are only two tokens of this type.

Although it is conceivable that the pattern described in the last paragraph reflects something about thematic structure, there is no reason to think it does. More likely, it reflects the ergative nature of Dyirbal. What it suggests is that one factor, apart from thematic structure, which governs decisions as to what to put within a chain is what the nature of coreference links between the clauses is. If a link is between S's and P's, semantic absolutives, the speaker is more likely to place the two clauses within a chain. But if one of the nominals is an A, then either a marked construction (like antipassive) must be used (though there is some question about A-A links, cf. Cooreman pp. 733-735, plus footnotes 3 and 4) or a new clause chain is necessary. The fact that new clause chains occur more often in such cases suggests that they are determined by the fact that otherwise an absolutive-absolutive link would not occur unless a marked construction were used.

What all this suggests is that when there is an S-A or P-A link, the speaker faces a choice as to whether to use an antipassive or start a new chain. The fact that new chains occur more often in such situations implies that this decision is not determined entirely by thematic structure. While it is probable that thematic structure plays a role in this decision, something else must be relevant as well. One cannot tell from Cooreman's data what that other factor is, but it is certainly possible that it is the topicality of the P. Hence the fact that antipassive is required in coordinate constructions if the coreferential nominal in the second clause is an A does not necessarily entail that Cooreman's claim is wrong. Unfortunately, one cannot tell from Cooreman's data whether such is the case. To do that, one would have to compare the topic continuity of P's in coordinate antipassive clauses in topic chains with the topic continuity of P's in ergative clauses at the beginning of topic chains when the A of that clause is the absolutive of the last clause of the preceding topic chain.

On the other hand, even if the data were to show that P's in antipassive clauses tend to be less topical than P's in ergative clauses of the sort just mentioned, we could only conclude that antipassive is determined *partly* by the topicality of the P. For one thing, topic chain boundaries are probably determined by thematic structure as well. In other words, it might be the case that in instances in which a clause is strongly connected thematically with the preceding clause, it will occur in that clause chain regardless of the topicality of the P. Second, the account outlined in the preceding paragraph applies only to coordinate structures; presumably with purposive constructions, the nature of the link is such that the option of a clause chain boundary does not arise. And third, although Cooreman does not give direct data on this particular point, there is reason to believe that antipassive occurs much more commonly in purposive clauses than in the coordinate construction. If I read her Table 7 correctly, it indicates that among the 60 antipassive clauses in the texts she examined, 48 occurred in purposive constructions and 12 in coordinate ones. This includes the 16 antipassives in which the P is unspecified and the 4 antipassives in which the P is nonreferential. Apparently for at least some of these 20 antipassives, there are two explanations for the use of antipassive: the syntactic requirements of the construction in which they occurred and the absence or nonreferentiality of the P. But this leaves only 12 antipassives in coordinate clauses. But since some of these 12 antipassives may involve an unspecified P or a nonreferential P and since some of these antipassive clauses may occur in the same topic chain as the preceding clause for thematic reasons, the number of antipassives in topic chains that *could* have been conditioned by the low topicality of the P is necessarily a very small percentage of the total number of antipassives.

We are left in a position, then, of concluding that the topicality of the P plays no role in determining the use of antipassive in Dyirbal, or that at most it plays a role in a small minority of cases. We have no concrete evidence in Cooreman's data that it plays even a minor role, though there is some circumstantial evidence that it may. The evidence that Cooreman presents in support of her claim regarding the relationship between topicality and P's in antipassive clauses is explainable in terms of other factors. The answer to the question posed by the title to this paper is that the three factors outlined in Hypothesis B determine antipassive, and hence that there is no evidence that discourse factors play any role in the choice of antipassive, though it remains possible that the factors determining topic chain boundaries include considerations of whether not having a topic chain boundary would result in an antipassive, and that the topicality of the P may play some role in determining whether to continue a topic chain with an antipassive or start a new topic chain with an ergative clause.

## *7. Conclusion*

The general methodological conclusion, therefore, is that in applying the topic continuity method, one should restrict its application to instances where there is a syntactic alternation that might be discourse-governed. Including examples where one alternant is required syntactically or semantically (where there is only one way to express the proposition being expressed) only introduces noise into one's data that may either obscure a real pattern or create the illusion of a nonexistent pattern, as appears to be the case with Cooreman's data. On the other hand, I should stress that the problem outlined here is not endemic to the methodology, but only illustrates how the methodology ought to be applied. The central purpose of Cooreman's paper, that of showing that A's are just as topical in Dyirbal as they are in other languages, is successfully achieved by use of the methodology.

It should be noted that in some respects, the first two uses of antipassive, in which the P is unspecified or nonreferential, do conform more closely to Cooreman's characterization, in that both cases involve P's that are highly nontopical. These instances of antipassive are determined by the properties of the P and could be described as backgrounding antipassives (cf. Foley and Van Valin 1985). On the other hand, the use of antipassive in topic chains is determined by the properties of the A; these uses of antipassive might be described as foregrounding antipassives, since they involve foregrounding the A in the sense that the A in such antipassive clauses must be coreferential to the absolutive in the preceding clause. There is clearly a unifying theme connecting these backgrounding and foregrounding uses of antipassive, since backgrounding the P and foregrounding the A both affect the *relative* status of the A and P in a similar way. The functions of antipassive are thus like the meanings of a polysemous morpheme: while it is necessary to distinguish different functions, these functions are clearly related.[10]

FOOTNOTES

This paper has benefited from helpful comments from Ann Cooreman and David Wilkins.

[1] The following abbreviations are used in the glosses of examples in this paper: abs (absolutive), nc$_i$ (noun class i), erg (ergative), pres/past (present or past), dat (dative), purp (purpose), loc (locative), repet (repetitive), instr (instrumental).

[2] Cooreman herself does not claim (5) and in fact specifically rejects it (p.c.).

[3] I ignore here issues surrounding the question of to what extent topic continuity measures, like referential distance, measure topicality. The term *topic* is used by different linguists to refer to a number of distinct notions. For the purposes of this paper, the term *topic* can be interpreted as *Cooreman's notion of topic*.

[4] The figures for ergative clauses in Table 1 do not add up to the stated total of 225 because the total includes a number of additional types of NPs, such as proper names and object clauses. The 239 ergative clauses mentioned previously includes 14 additional clauses in which the A is not specified.

[5] There is a sense in which antipassive clauses with an unspecified P might be considered a discourse-governed alternation. And while Thompson (1987) describes the "agentless" passive in English as syntactically determined, there is also a sense in which one might consider this use of passive to be discourse-governed. Namely, to at least some extent, the decision to use an agentless passive in English may be triggered by a decision by the speaker not to mention the agent, either because it is unimportant or for some other reason. There may be instances of antipassive clauses in Dyirbal in which the P is unspecified for similar reasons. In so far as the decisions not to specify the P in such instances reflect the extremely low topicality of the P, this use of antipassive might indeed be said to be triggered by the low topicality of the P. The major point of this paper, however, is that the topicality of P's does not affect the use of antipassive when the P is specified (and referential). Note that the RD (referential distance) for P's in the two kinds of clauses shown in Table 1 is based on clauses in which the P is specified. It is the difference in RD for *those* clauses that I argue here is epiphenomenal.

[6] There is one systematic exception to the requirement that adjacent clauses within a topic chain involve coreferential absolutives. Namely, if the S or P in a clause is coreferential to the ergative nominal in the preceding clause, then the verb is marked with a suffix *-ŋura*, indicating this. I will ignore the complications presented by this clause type in this paper since they are orthogonal to the issues at hand.

[7] Though not attested for antipassive in the data Cooreman examined, Dixon (1972: 80) describes a fourth use of antipassive, an anticipatory use where the antipassive is used in a clause because the A is going to be the absolutive of the *next* clause. (There is one instance of a "false reflexive" clause in the texts Cooreman examined that has this property, her (22) on p. 733; in general, false reflexives strongly resemble antipassives, and seem to be a kind of antipassive from a functional point of view.) To cover this possibility, Hypothesis B should really be complicated accordingly, but I ignore this possibility throughout this paper since the primary point of this paper is methodological, and incorporating this possibility into the discussion would only complicate discussion. There appear to be other infrequent uses of antipassive that are not attested in this corpus that are not covered by Hypothesis B. For example, Dixon (1972: 75) cites an example (his (133)) in which antipassive is used where the A in the antipassive clause has as antecedent in

the preceding clause, not an absolutive nominal, but a dative P in another antipassive clause. There is also one sentence in the texts Cooreman examined that does not conform to the literal interpretation of Hypothesis B. Namely, in this example (Cooreman's (21), p. 733), the antipassive verb bears the further suffix *-ŋura,* which indicates that the absolutive of the verb so marked should be interpreted as having the ergative nominal in the preceding clause as antecedent, so the antecedent in the preceding clause is ergative not absolutive. But this is exactly the function of *-ŋura,* and in an account that incorporated the function of *-ŋura,* this example would be straightforwardly handled in terms of the interaction of antipassive and *-ŋura.* David Wilkins (p.c.) reports that there are also other specialized conditions in which antipassive is either impossible or obligatory.

[8] It should be noted that there is a third hypothesis that comes closer than Hypothesis A to describing the distribution of antipassives:

Hypothesis C: Antipassive is used if and only if the A is more topical than the P.

If we assume that unspecified or nonreferential P's are necessarily less topical than referential A's, then this covers the first two uses of antipassive listed in (10). If we otherwise assume that referential distance is an accurate measure of topicality, this hypothesis predicts that antipassive will be used whenever the RD of the A is less than the RD of the P. While this covers a large number of cases, it still fails in two situations: when both A and P have an RD of 1 and when neither A nor P have an RD of 1 but the RD of the A is less than the RD of the P.

[9] The last two categories in Table 2 involve clauses where there are two coreferential nominals linking the two clauses.

[10] In a more recent paper discussing antipassives crosslinguistically, Cooreman (1990) discusses the Dyirbal antipassive somewhat differently from her earlier paper, explicitly noting that antipassive in topic chains is used for structural rather than semantic/pragmatic reasons and proposes that this use of antipassive involves a co-opting of the construction for a function distinct from its original function.

## REFERENCES

Cooreman, Ann. 1988. Ergativity in Dyirbal discourse. *Linguistics* 26:717-746.

Cooreman, Ann. 1990. A functional typology of antipassives. Paper delivered at the Santa Barbara Conference on Voicing.

Dixon, Robert M. W. 1972. *The Dyirbal Language of North Queensland.* Cambridge: University Press.

Foley, William, and Robert Van Valin. 1985. Information packaging in the clause. In Timothy Shopen, ed., *Language Typology and Syntactic Description 1: Clause Structure.* Cambridge: University Press.

Givón, T., ed. 1983. *Topic Continuity in Discourse: A Quantitative Cross-Language Study.* Amsterdam: John Benjamins.

Mallinson, Graham, and Barry J. Blake. 1981. *Language typology.* Amsterdam: North-Holland.

Thompson, Sandra A. 1987. The passive in English: a discourse perspective. In Robert Channon and Linda Schockey, eds., *In Honor of Ilse Lehiste.* Dordrecht: Foris.

ESCOL '90 102-111

# IN DEFENSE OF [± FOC]

Thorstein Fretheim and Randi Alice Nilsen
University of Trondheim, Norway

## 1. INTRODUCTION.

### 1.1. *Intonational Phrases.*

This is a report on current work on the relations between sentence intonation and focus structure in Norwegian. Our model of Norwegian intonation postulates a hierarchically ordered set of prosodic constituents. The largest unit of analysis is referred to as the **IU** (= "Intonation **U**nit", or "Intonation **U**tterance"). An IU consists of at least one, and at most two **IP**s (= "Intonational **P**hrases"), followed optionally by one or more extrametrical constituents of the next lower type, the F (= "Foot"), to be defined in § 1.2. (see Nilsen in prep).

Whenever there are two IPs in the IU, one of them is the phonological counterpart of a syntactic FOCUS DOMAIN (FD) containing what we identify as the THEME of the utterance, while the other IP corresponds to a syntactic FD containing its RHEME. The rheme is either what is predicated of the theme (if the theme is an argument), or else it is simply an affirmative or a negative polarity assigned to a proposition embodied in a sentential thematic constituent.

IU-final elements that are extrametrical to the IP level of the prosodic hierarchy form BACKGROUND DOMAINS containing discourse-retrievable information.

Phonologically the IP constituent is the domain of the type of f0 (fundamental frequency) downtrend called CATATHESIS by Pierrehumbert and Beckman (1988). The West Norwegian and the East Norwegian catathesis phenomena are phonetically rather different. In West Norwegian there is a new downstepping process for each IP, but in East Norwegian speech, which the majority of our intonation analyses have been based on (see e.g. Fretheim 1987, 1988, 1990, in press; Fretheim and Nilsen 1989a, 1989b; Nilsen 1989) there is no catathesis effect before the first IP boundary. East Norwegian f0 downtrend patterns are restricted to whatever is left of an IU subsequent to its first IP constituent.

### 1.2. *Tonal Feet.*

An IP consists of one or more **F** constituents (= "(tonal) **F**eet"), plus an optional IU-initial anacrusis (upbeat) of one or more F-external syllables (σ), as well as optional F-external and IP-final unaccented syllables coming immediately after the f0 peak of a focal phrase-accent.

The F constituent corresponds roughly to Pierrehumbert and Beckman's Accentual Phrase in Japanese prosody (Pierrehumbert and Beckman ibid.) It is composed of an obligatory HEAD in the form of an accented PROSODIC WORD (ω), and an optional TAIL containing any residual unaccented word forms after the tone pertaining to the word-accent (word-tone) of the first, or first two syllables of the F. Being a constituent of a size intermediate between the IP and the prosodic word, our F does not equal the so-called metrical foot (Σ, or F) of current nonlinear phonology (cf. e.g. Selkirk 1980, Goldsmith 1990).

The word-accent of the head (ω) of a Norwegian F is a pitch accent. There are two contrasting morpholexically differentiating pitch accents in Norwegian: Accent 1 and Accent 2. In East Norwegian, the former is characterized by a F-initial tone **L**, and the latter by a contour tone **HL**. Both are realized in the course of the tone-bearing units of the ω. A speaker will generally spend a single syllable getting down to the pitch minimum of an Accent 1 contour, and one or two syllables (depending on the number of syllables in the F, the location of any unvoiced segments, rhythmical considerations, etc.) to arrive at the pitch minimum of an Accent 2 contour.

In addition to the word-accent realized in the head of the F unit, the F is also the locus of two contrasting types of phrase-accent associated to the F-final syllable, a moderately high-pitched boundary tone - **H%** - for NONFOCAL phrase-accent, and a considerably higher f0 peak - marked by the boundary tone of **Hfoc%** - for a FOCAL phrase-accent. When the F is short enough, this F-final phrase-accentual tone is associated to the same σ as the L tone realizing the word-accent, but in a multisyllabic F there is a sequence of σ's between the σ realizing L and the F-final σ bearing phrase-accent that have no tone. This underspecification is in keeping with Pierrehumbert and Beckman's proposal about underspecification of tones in relation to tone-bearing units even in surface phonological representations of Japanese tone structure. In a long F in Norwegian, there is simply a slower, or less steep transition from the word-accentual L to the syllable manifesting the right-edge boundary tone of the F unit.

The end of a focally accented F very often coincides with the end of an IP. There is just one focally accented F in an IP, and that unit is invariably the IP-final F. The only utterance elements that may intervene between the final syllable of a focal F and the final syllable of an IP are extrametrical unaccented syllables. Such syllables will either stay high, at much the same pitch level as the F-final maximum, or they will drop in pitch, due to a falling terminal tone (cf. Fretheim 1990).

F-external extrametrical syllables are clearly less frequent in certain East Norwegian dialect areas than in certain others. Suppose that they did not exist at all. Then the end of a focally accented F would always occur simultaneously with the end of an IP. Would that hypothetical situation justify an analysis according to which the focus tone of Hfoc% is associated to the IP level instead of the F level, obviating our postulated contrast between two phonologically distinct types of F, the focal and the nonfocal ones? The answer to that question is negative. The fact that the right-hand boundaries of the IP and the focal F do not always coincide does not in itself provide us with sufficient grounds to establish two types of F unit distinguished by the syntagmatic contrast between a lesser (nonfocal) and a higher (focal) end peak. As the IP category is needed in our model anyway, it is legitimate to ask what prevents us from simplifying things by saying that the higher f0 peak indicates an IP boundary, while the more moderate f0 peak indicates an F boundary, eliminating the focal v. nonfocal F contrast.

We are here going to defend an analysis that maintains the binary feature assignment of [+foc] for focal, against [-foc] for nonfocal, to the tonal Feet of an IU. According to our model of Norwegian intonation, as outlined in the publications referred to above, the IP structure of an IU is a function of the assignment of the feature [+foc] to at least one and at most two F constituents.

The claim that Norwegian IUs are composed of two phonologically contrasting kinds of F constituent, focal and nonfocal, is motivated by our interest in constructing an intonation model that accounts for the pragmatic function of intonational phrasing, and not just the phonological form of Norwegian intonation patterns. That makes our scope wider than Pierrehumbert and Beckman's, for example. In what follows, we are going to apply some central features of Pierrehumbert and Beckman's prosodic theory to the description of Norwegian intonation. In particular, we will use their prosodic trees exhibiting autosegmental linking of the tones of a tone tier to substantive elements of an utterance, where the autosegmental associations can be made not only to minimal tone-bearing units (σ) but also to higher-level nodes representing higher-order prosodic constituents.

Our featural opposition of [±foc] is a theoretical construct that is alien to Pierrehumbert and Beckman's theory as expounded in their prosodic analyses of Japanese (ibid.) and English (Pierrehumbert and Beckman 1986). We will demonstrate that [+foc] attached to focal F nodes and [-foc] attached to nonfocal F nodes are features motivated by an assumed interaction between the syntactic and the sentence-prosodic module of the grammar of (spoken) Norwegian, an interaction required for generating the FOCUS STRUCTURE of utterances.

## 2. THE INTERACTION OF INTONATION AND SURFACE SYNTAX.

### 2.1. *The phonological prerequisites.*

We will now illustrate the essentials of intonational phrasing in (East) Norwegian. The sentence *Jeg tror jeg finner et sted å sove* means literally 'I believe I find a place to sleep'. Two different interpretations of this sentence can be seen to emerge if you consider its meaning in context (situated meaning), but the speaker's choice of intonation pattern gives the addressee important cues as to how the speaker intends his utterance to be understood. In fact, we believe the speaker's intonational phrasing to disambiguate the above sentence structure.

In the intonational notations presented in (1)-(2), heads of focal Feet are represented with small capitals, and head and tail components of a Foot are connected by means of hyphens, in addition to the labeled parentheses.

(1) a ( ( jeg ($^1$TROR-jeg $_F$)$_{IP}$) ( ($^1$finner-et $_F$) ($^1$sted-å $_F$) ($^2$SOVE $_F$)$_{IP}$)$_{IU}$)

b ( ( jeg ($^1$tror-jeg $_F$) ($^1$FINNER-et $_F$)$_{IP}$) ( ($^1$sted-å $_F$) ($^2$SOVE $_F$)$_{IP}$)$_{IU}$)

(2) ( ( jeg ($^1$tror-jeg $_F$) ($^1$finner-et $_F$) ($^1$sted-å $_F$) ($^2$SOVE $_F$)$_{IP}$)$_{IU}$)

When produced with one of the two double-focus phrasings of (1), the utterance means that the speaker has a fairly bright view of his chances to find a bed for the night. If there is just one IP exhausting the IU, as in (2), then the meaning changes to 'I guess I'll go to bed now', uttered in a context where the speaker is taking leave of his company because he is tired, and where there is no particular bed that has been defined in advance as *his* bed. (1)a-b may be said to admit an "assumption" or "belief" interpretation only, and (2) an "intention" or "purpose" interpretation (cf. Fretheim, forthcoming).

By means of tonal excursions determined by the locations of focal feet, as spelled out in the above transcriptions, the speaker succeeds in dividing the utterances of (1) into two temporally distinct FOCUS DOMAINS (FDs), one rhematic and the other one thematic. The rhemes of (1)a-b comprise the finite main clause verb and the finite complement clause verb, respectively, while the thematic FD of (1a) is the postfocal complement clause *jeg finner et sted å sove*, and the thematic FD of (1b) the postfocal NP *et sted å sove*. Observe that the rheme constituents here precede the theme constituents (cf. § 2.2. below).

There is a very minor difference in information structure between (1a) - meaning 'As for my finding somewhere I can sleep, I DO believe I'll find such a place' - and (1b) - meaning 'As for a place where I can sleep, I believe I'll FIND one'. In contradistinction to the prososyntactic structures of (1), the alternative of (2) is a themeless structure, an all-rheme structure appropriate for out-of-the-blue statements. The speaker of (2) is presenting the complement clause VP *finner et sted å sove* ('find a place to sleep') as a piece of new, rhematic information, whereas the intonation employed by the speaker of (1) is textually appropriate just in case the question where the speaker is going to spend the night has already been brought up in the discourse.

Figures 1, 2, and 3 present pitch tracings of the IU structures of (1a), (1b) and (2), respectively, with an indication of where in the f0 curve the various phonologically distinctive word-tones and phrasal boundary tones are located.

Figure 1

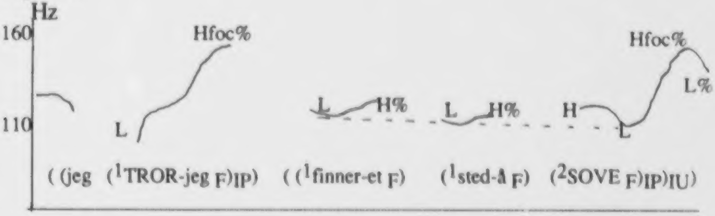


Figure 2

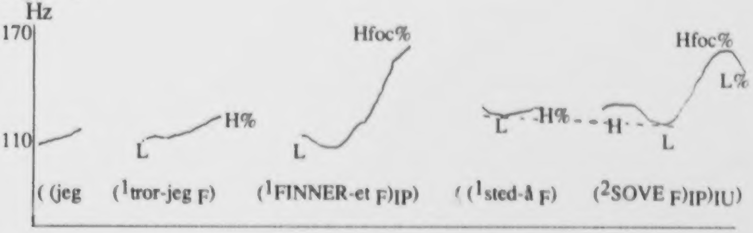
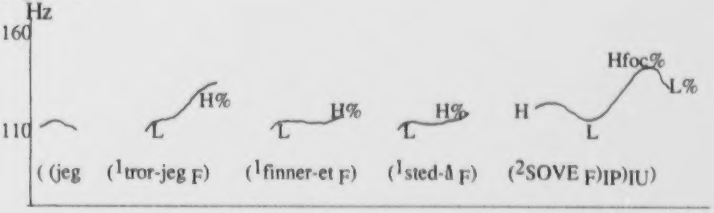


Figure 3



The L's and H's inserted in the f0 curves on the preceding page[1] are word-accentual tones, while H% and Hfoc% are the two types of F-based boundary tones. Utterance-final L% is a terminal boundary tone associated to the top node of IU. A broken line drawn through the F minima after the first elevated focus peak of Figures 1 and 2 shows the East Norwegian postfocal catathesis.

Figure 2' and Figure 3' show phonological tree representations (with an interpolated tone tier) of the respective signals of Figure 2 and Figure 3 .

Figure 2'

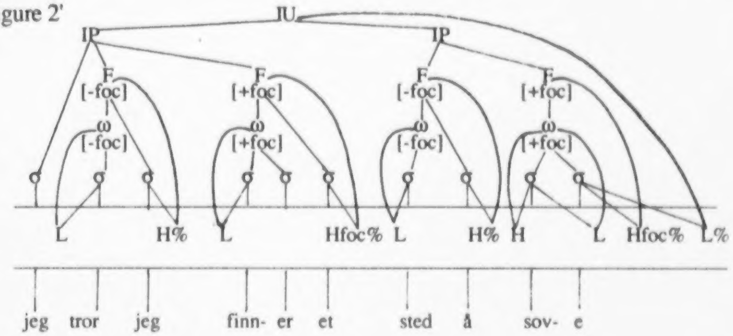
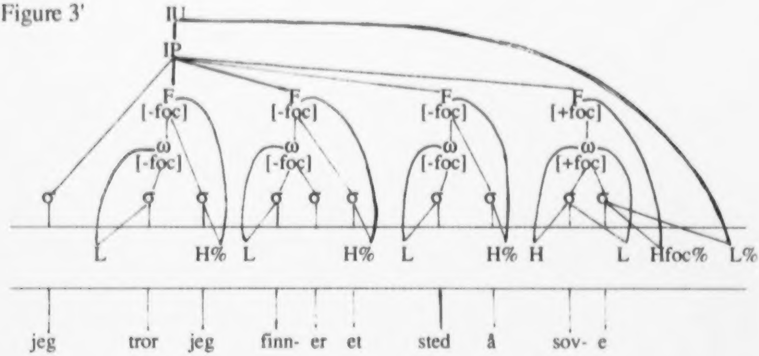
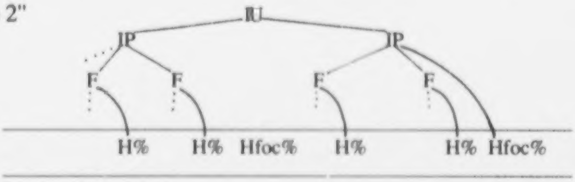

IU
IP
IP
F [-foc]
ω [-foc]
F [+foc]
ω [+foc]
F [-foc]
ω [-foc]
F [+foc]
ω [+foc]
σ
L
H%
L
Hfoc%
L
H%
H
L
Hfoc%
L%
jeg
tror
jeg
finn-
er
et
sted
å
sov-
e

Figure 3'


IU
IP
F [-foc]
ω [-foc]
F [-foc]
ω [-foc]
F [-foc]
ω [-foc]
F [+foc]
ω [+foc]
σ
L
H%
L
H%
L
H%
H
L
Hfoc%
L%
jeg
tror
jeg
finn-
er
et
sted
å
sov-
e

The most striking difference between our prosodic representations and Pierrehumbert and Beckman's representations for Japanese is probably the presence of the binary feature of [±foc] in our description of Norwegian, and the absence of any analoguous construct in their model. Suppose we dispensed with [±foc] for the focal v. nonfocal F contrast. Then there would be phrase-accentual association lines connecting the F node with H% and the IP node with Hfoc%, as suggested in the following alternative to Figure 2'.

Figure 2"



An alternative representation based on the principles of Figure 2" would be inadequate for our purpose. The reason is that it treats the IP-final F just like any other F. We are concerned with the impact of intonational phrasing on focus structure. In our opinion it is necessary to define the FDs of focus structure as syntactic, not prosodic units. Our tonally and rhythmically delimited F and IP units are not conceptual units. Sometimes there is a glaring mismatch between the prosodic components of an utterance and its meaning components. For example, the first F of all three intonation structures (1a), (1b), and (2) is composed of a finite verb plus an unaccented pronoun functioning as main clause subject, and the second F comprises a finite verb and an unaccented indefinite article forming a syntactic and conceptual unit with the head of the next F, etc.

Syntactic constituents do mesh with conceptual units, so we define our focus structures as syntactic trees enriched with information about what syntactic nodes are focused (= FDs). Among other things this means that neither the first FD of (1a)/Figure 1 nor the first FD of (1b)/Figure 2 can be coextensive with the first of the two IPs of those prososyntactic forms. Instead, in defining the limits of a given FD in syntax matching a given IP in phonology we have to depart from the item that will invariably belong to an FD, namely the formative that is the syntactic counterpart of the head of a focal $F_i$. How much more goes into a given FD depends on the syntactic phrase structure of the string that is coextensive with the IU dominating $F_i$. An FD can not cut across syntactic phrase boundaries.

### 2.2. *Focus Structures.*

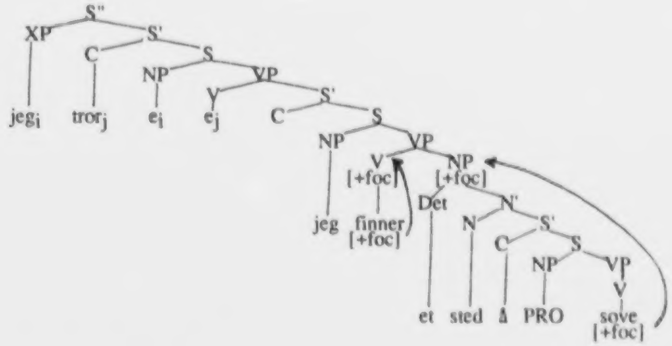
Our idea is that the binary features [±foc] of the prosodic trees of Figure 2' and Figure 3', which originate as properties of the F node, are inherited by the head (ω) of the F, and for each ω marked [+foc] or [-foc] in phonology there is a corresponding formative in surface syntax that is similarly specified. Such formatives serve as FOCUS EXPONENTS (cf. von Stechow and Uhmann 1986). We assume that on the syntactic side, the feature [+foc] percolates upwards and leftwards in the syntactic tree from a focus exponent to some higher syntactic node, subject to some rather obvious constraints on focus projection. The maximal projection of [+foc] defines an FD; a syntactic tree with specified FD positions is a focus structure; and a focus structure forms the input for a set of theme/rheme interpretation principles (Fretheim in press; Nilsen 1989).

[+foc] is assumed to percolate to the highest syntactic node dominating no more than a single focus exponent and no instance of [-foc] on a right-hand branch[2]. The latter constraint reflects the fact that IP boundaries in phonology establish an FD boundary to the right.

In the syntactic counterpart of the single-IP contour of Figure 3 there is nothing to prevent [+foc] from percolating all the way to the top sentence node, thereby defining the entire syntactic structure as one FD. We refer to that situation as BROAD FOCUS, borrowing a term from Ladd (1980). NARROW FOCUS obtains when [+foc] is curtailed by the appearance of another focus exponent in the syntactic tree, or the appearance of [-foc] on a right branch.

Figure 4 presents the focus structure generated by the interaction of the syntax of our sentence *Jeg tror jeg finner et sted å sove* and the intonational phrasing of Figure 2.

Figure 4



Both FDs of Figure 4 belong to the VP of the finite complement clause. That VP is not itself an FD, i.e. a highest node marked [+foc], as it dominates two focus exponents. There is a narrow focus on the V *finner* (finds) and another narrow focus on the NP *et sted å sove* (a place to sleep).

For a discussion of various theme/rheme interpretation principles applying to focus structures like Figure 4, see in particular Nilsen (1989). Here we will just mention three of them. Principle 1 says that a node S'' furnished with [+foc] counts as an all-rheme structure; Principle 2 says that if there are two FDs under that S' node which is the sister of the main clause constituent of XP, then the first focus is rhematic, and the second focus thematic; Principle 3 says that if XP is an FD and its sister node S' - or a proper subpart of S' - is also an FD, then the former is thematic and the latter rhematic. Principle 1 applies to the focus structure corresponding to Figure 3. Principle 3 is inapplicable to the prososyntactic structures considered in the present paper. Finally, Principle 2 applies both to the focus structure matching Figure 1 and the focus structure matching Figure 2. In those structures the respective finite verbs *tror* and *finner* are focused due to the rhematic affirmative polarity of the statements expressed, and their respective syntactic complements are perceived as thematized FDs.

## 3. SUMMING UP.

We have tried to demonstrate how our theory of intonation-syntax interaction motivates the incorporation of the binary feature contrast of [±foc] in a description of Norwegian intonation. We are not only concerned with the analysis of intonational form, we are just as much concerned with the way that an intonation pattern and a syntactic phrase structure together generate a focus structure. Instead of treating a given intonational focus as a surface reflex triggered by certain syntactic-semantic diacritics, we hold that intonation and syntax should be viewed as autonomous modules of grammar, and that the feature [+foc] implemented in f0 contours achieves linguistic significance only when its position in the phonetic string is related to syntactic constituents. It is important to bear in mind, though, that the process of Norwegian [+foc] or [-foc] assignment does not take place in syntax. The only perceivable effects of [±foc] assignment are some systematic pitch variations that we identify as the intonation pattern of an utterance, but in his comprehension task a hearer cannot exploit this intonational contrast unless he interprets it in syntactic terms, in the manner outlined in §2.2. The items mediating between syntactic and intonational form are the heads (ω) of tonal Feet.

FOOTNOTES

1. Our phonetic equipment is a PM Pitch Analyzer coupled with an RCA screen and a Hewlett-Packard plotter.
2. Even [-foc] is believed to percolate, but the information-structural contributions of nonfocal phrase-accent will not be covered in this paper.

REFERENCES

Fretheim, T. 1987. Pragmatics and intonation. In J. Verschueren and M. Bertuccelli-Papi (eds.) *The Pragmatic Perspective*. Amsterdam:John Benjamins. 395-420.

Fretheim, T. 1988. 'Broad focus' and 'narrow focus' in Norwegian intonation. unpublished, University of Trondheim.

Fretheim,T.1990.The form and function of foot-external syllables in Norwegian intonation. In K. Wiik and I. Raimo (eds.) *Nordic Prosody V*. Turku:Painosalama. 87-110.

Fretheim, T. in press. Intonational phrases and syntactic focus domains. In J. Verschueren (ed.) *Levels of Linguistic Adaptation*. Amsterdam:John Benjamins.

Fretheim, T. forthcoming. Verba sentiendi as metapragmatic terms. *Papers in Pragmatics.*

Fretheim, T. and Nilsen, R.A. 1989a. Comprehension in the syntax-intonation interface. In Ö. Dahl and K. Fraurud (eds.) *Papers from the First Nordic Conference on Text Comprehension in Man and Machine*. Stockholm:Institute of Linguistics. 89-98.

Fretheim, T. and Nilsen, R.A. 1989b. Terminal rise and rise-fall tunes in East Norwegian intonation. *Nordic Journal of Linguistics* 12:155-182.

Goldsmith, J.A. 1990. *Autosegmental and Metrical Phonology*. Oxford:Basil Blackwell.

Ladd, D.R. 1980. *The Structure of Intonational Meaning*. Bloomington:Indiana U. Press

Nilsen, R.A. 1989. On prosodically marked information structure in spoken Norwegian.*University of Trondheim Working Papers in Linguistics* 7:1-101.

Nilsen, R.A. in prep. Central Issues in Norwegian Intonology. Doctoral dissertation, University of Trondheim.

Pierrehumbert, J.B. and Beckman, M.E. 1986. Intonational structure in Japanese and English. *Phonology Yearbook* 3:255-310.

Pierrehumbert, J.B., and Beckman, M.E. 1988. *Japanese Tone Structure*. Cambridge:The MIT Press.

Selkirk, E.O. 1980. The role of prosodic categories in English word stress. *Linguistic Inquiry* 11:563-605.

Stechow, A. von, and Uhmann, S. 1986. Some remarks on focus projection. In W. Abraham and S. de Meij (eds.), *Topic, Focus, and Configurationality*. Amsterdam:John Benjamins, 295-320.

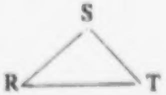
ESCOL '90 112-123

# THE BERMUDA TRIANGLE OF SYNTAX, RHYTHM AND TONE

Yuchau E. Hsiao
University of California, San Diego

In this paper, I address questions regarding the relationship between syntax and two phonological elements, namely, rhythm and tone, based on evidence from ordinary speech and verse in Taiwanese.[1] This triangular relationship is embodied in (1):

(1)



S = Syntax
R = Rhythm
T = Tone

Rhythmic structure is the key to the contrast between popular spoken language and more stylized linguistic forms such as poetry and folk song lyrics, and tone sandhi applied to these two types of language is more sensitive to prosodic domains in the former case, and more sensitive to metrical domains in the latter case. First of all, I will discuss the relationship between syntax and tone, focusing on the ways in which the domain on which tone sandhi operates may be predicted based on syntactic factors. I will then address the relationship between syntax and rhythm, dealing with the question of how metrical structure may be syntactically defined, and then the relationship between rhythm and tone by showing how tone sandhi may be rhythmically conditioned. Finally, I will comment on the properties of prosodic and metrical categories. The present study, to my knowledge, is the first to apply such data to this peculiar triangular relationship.

## Syntactically Defined Domains for Tone Sandhi

Chen (1987,1990) proposes rules (2) and (3) to account for Taiwanese (or Xiamen) tone sandhi:

(2) Tone Sandhi Rule (TSR)
T --> T' / __T within a tone group (T = base tone; T' = sandhi tone).

(3) Tone Group Formation (TGF)
Mark the right edge of every XP with #, except where XP is an adjunct c-commanding its head.

(2) dictates that the rightmost tone within a tone group (TG) retains its base tone, and all the preceding tones are changed into sandhi tones. (3) expresses that the TG is formed from XPs which are not adjuncts.[2] (4-6) serve to demonstrate the application of Chen's rules:

(4) [Qiq zho]$^{VP}$ # [beq m-dio]$^{VP}$ #
seven do eight not-right
T' T T' T' T

'To do (it) seven times, and fail eight times.'

(5) [Qiq zho beq]$^{S}$ # [m-dio]$^{VP}$ #
seven do eight not-right
T' T' T T' T

'Equating seven to eight is incorrect.'

(6) [[Beq siq]$^{AP}$ mui-gui]$^{NP}$ #
white color rose
T' T' T' T

'White rose.'

(7) [[Tang bi$^{n}$]$^{PP}$ gue]$^{NP}$ #
window by moon
T' T T'

'The moon by the window.'

In (4), beq undergoes tone sandhi since it is an element within the first VP. On the other hand, beq in (5) is an element within S, where it is the rightmost syllable and therefore does not undergo tone sandhi, but rather retains its base tone. As to the AP in (6) and the PP in (7), they do not qualify to be TGs in that they are adjuncts which bear a sister-relation to the heads and therefore c-command the latter, within the NPs.

Chen's analysis accounts for an impressive range of data in this dialect, generalizing the otherwise messy tonal phenomena with the two succinct rules in (2) and (3). The question remaining is whether tone group in Taiwanese is purely a syntactic unit. Inkelas and Zec (1990) interpret Chen's tone group formation as counterevidence that eludes the theorems made in the prosodic framework, which has the potential to be misleading. Consider (8):

(8) Niao-ci]$^{NP}$# ze ga gun bo]$^{NP}$# pi-pi-cua]$^{VP}$#
Mouse many COM my wife shiver
T' T T' T' T' T T' T' T
.......]# ........................]# .............]#

'There are so many mice that my wife is shivering.'

As structurally elucidated in (8), the tone group is in fact a prosodic unit. The syllable string ze ga gun bo, 'many COM my wife', between the two NP boundaries does not form a syntactic constituent, but rather, the component syllables construct a prosodic domain, that is to say, a phonological phrase. Thus I would like to propose the principle of phrasing the phonological phrase as follows:

(9) Phonological Phrase (PhP)
The PhP boundary # is marked at the right edge of an XP if the XP is not an adjunct.

Again, the implication behind this principle is that domains to which tone sandhi is applied are formed indirectly from syntactic input, i.e., via the prosodic level.

This prosodic phrasing alone, however, does not account for problems arising from alternative readings. Take (10), for example:

(10) [[Beq siq]$^{AP}$ # mui-gui]$^{NP}$ #
white color rose
T' T T' T

'White rose.'

In spite of being an adjunct, the AP in (10) seems to form a TG, since *siq* surfaces with a base tone, in violation of Chen's rules. Similarly, this violation can be seen in (11):

(11) [[Tang bi$^{n}$]$^{PP}$ # gue-niu]$^{NP}$ #
window by moon
T' T T' T

'The moon by the window.'

The only difference between (7) and (11) is that the latter has a disyllabic head, *gue-niu*, 'moon', as opposed to the monosyllabic head, *gue*, 'moon', in the former. Although the syntactic bracketing remains the same, *bi*$^{n}$ retains its base tone in (11), but not in (7). In other words, (10) and (11) present a problem in that a TG boundary # is marked at the right edge of adjunct XPs.

A second problem is that the TG boundary may fail to appear at the right edge of XPs which are not adjuncts. (12) and (13) illustrate this:

(12) [Gim]$^{NP}$ [boq]$^{NP}$ # [zui]$^{NP}$ [hui]$^{NP}$ [to]$^{NP}$ #
Gold wood water fire soil
T' T T' T' T

'Gold and wood, water, fire and soil.'

(13)* [Gim]$^{NP}$ # [boq]$^{NP}$ # [zui]$^{NP}$ # [hui]$^{NP}$ # [to]$^{NP}$ #
Gold wood water fire soil
T T T T T

'Gold and wood, water, fire and soil.'

In (12) neither *zui* nor *hui* nor *gim* are right-marked with the TG boundary. As a result, three syllables in (12) surface with sandhi tones, but the reading is acceptable. When all the NPs are right-marked with the TG boundary, i.e., when all the (rightmost) base tones are retained, surprisingly, an undesirable reading is derived, as in (13). This happens not only in a string of NPs like the examples above, but also in structures of more syntactic complexity. Compare the tonal behavior of the first two syllables in (14) with that in (15):

(14) [Jing]$^{NP}$ # [qim su hai]$^{AP}$
Love deep as sea
T T' T' T

'Love is as deep as the sea.'

(15) [Jing]$^{NP}$ # [qim su hai]$^{AP}$
Love deep as sea
T' T T' T

'Love is as deep as the sea.'

(14) is accounted for by the TSR in (2) and the TGF in (3), as the NP is bounded by # and the base tone of *jing*, 'love', remains unchanged. On the contrary, in (15) *jing* surfaces with a sandhi tone, and *qim*, 'deep', invariantly carries a base tone as if followed by #, a TG boundary. However, (15) is an alternative reading of (14), which leads to a third problem, i.e., the TG boundary is marked XP-internally. This is seen more clearly in (16) and (17):

(16) [Bo-dap wun-jing]$^{VP}$ #
repay kindness
T' T' T' T

'Repay (one's) kindness.'

(17) [Bo-dap # wun-jing]$^{VP}$ #
repay kindness
T' T T' T

'Repay (one's) kindness.'

The VP in (16) and (17) consists of a disyllabic verb and a disyllabic noun. *Dap* in (16), as predicted, changes to a sandhi tone, while in (17) it holds on to its base tone. Again, both are alternative readings. What is of interest here is that the VP in (17) seems to break into two parts; within each, tone sandhi operates. The question then is what constitutes the parsed domains for tone sandhi, perhaps V and N? This is unlikely, since tone sandhi would have to be sensitive to a) the head (V), b) its complement (N), and c) its maximal projection (VP). The derivations of tone patterns would then miss the appropriate generalization. For one, Selkirk's (1986) end-based theory implies that a phonological process is either sensitive to a head derived domain or sensitive to an $X^{max}$ derived domain, but not both. A possible argument thus appears to be that tone sandhi may alternatively apply to domains other than those defined on a syntactic-prosodic basis.

Alternative readings like (10-12,15) sound rather poetic. An eligible account for such tonal behavior may rest upon the rhythmic structures, the foot in particular. It is in fact the foot that serves as the relevant domain over which to condition the operation of tone sandhi in (17), as illustrated by (18).

(18)   f          f
       / \        / \
  [Bo-dap # wun-jing]$^{VP}$ #
   repay     kindness
   T' T       T' T

'Repay (one's) kindness.'

This VP actually consists of two feet. When the TSR applies to the feet, the tones of the foot-final syllables are kept invariant, while those of the preceding syllables merge with sandhi forms. The question which then arises is how the foot is built.

Chen (1984) and Shih (1986,1990) posit several foot formation rules for Mandarin (a northern dialect of Chinese). In spite of the great geographic and linguistic distance between Mandarin and Taiwanese, I observe that these two dialects exhibit extremely similar rhythmic properties (cf. Hsiao 1990a,b). The **Foot Phrasing Principles** (FPPs) that I will propose for Taiwanese, therefore, are in principle developed and revised from Chen's and Shih's Mandarin rules, as given below:

(19) Immediate Constituent Foot (ICF)
Any two adjacent syllables are grouped into a disyllabic foot if they are ICs of the same syntactic binary branching node.

(20) Adjacent Syllable Foot (ASF)
Adjacent syllables are paired into disyllabic feet from left to right if neither syllable is subject to the ICF.

(21) Jumbo Foot (JF)
A stray syllable is recruited by a neighboring foot to form a jumbo foot according to its syntactic branching, or recruited by the right-adjacent foot if the syntactic information is insufficient.

The ICF is in fact a cross-dialectal phenomenon among Chinese dialects, such as Mandarin, Chongming, Shanghai, Xuzhou, et cetera. Given this principle, it becomes clear that in (18), *bo* and *dap* are ICs of V, and *wun* and *jing* are ICs of N. Two disyllabic feet are thereby constituted. Consider again (10) and (11), as structurally described in (22) and (23):

(22)  f  f
/ \  / \
[[Beq siq]$^{AP}$ # mui-gui]$^{NP}$ #
white color  rose
T' T  T' T

'White rose.'

(23)  f  f
/ \  / \
[[Tang bi$^{n}$]$^{PP}$ # gue-niu]$^{NP}$ #
window by  moon
T' T  T' T

'The moon by the window.'

The ICs of AP in (22) and those of PP in (23) are respectively grouped into disyllabic feet, therefore, both *siq* in (22) and *bi$^{n}$* in (23) become the rightmost syllable in the relevant tone group (foot), constantly carrying their base tones. This principle, however, does not predict the tonal behavior of the first two syllables in (15), where *jing* is subcategorized as subject NP and *qim* is the head of AP. The fact that *qim* retains its base tone but *jing* does not is due to these two syllables constructing a foot, as structurally described in (24):

(24)  f  f
/ \  / \
Jing qim  su hai
Love deep  as sea
T' T  T' T

'Love is as deep as the sea.'

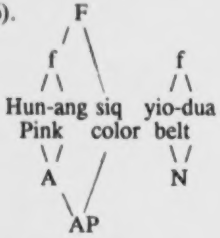
In (24), the first two syllables, *jing* and *qim*, are subject to the ASF in (20), as they are grouped into a disyllabic foot. Further application of the ASF can be seen in (25).

(25)  F
/ \
f  f
/ \  / \  \
Gim boq  zui  hui  to
Gold wood  water fire  soil
T'  T  T'  T'  T

'Gold and wood, water, fire and soil.'

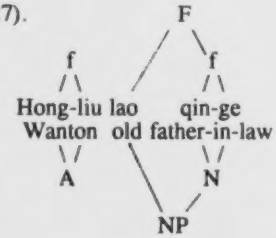
In (25), there is a string of coordinate NPs, thus they are not subject to the ICF, but rather to the ASF, and adjacent syllables are paired into disyllabic feet from left to right. That is to say, the first four syllables form two AS Feet. The final syllable *to*, meaning 'soil', is then recruited by the second foot to form a Jumbo Foot, in conformity with the JF in (19). Now consider (26-28):

(26).


F
f
f
Hun-ang siq yio-dua
Pink color belt
A
N
AP

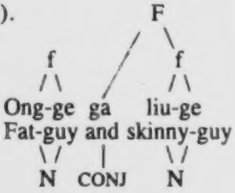
'Pink color belt.'

(27).


F
f
f
Hong-liu lao qin-ge
Wanton old father-in-law
A
N
NP

'The wanton old father-in-law.'

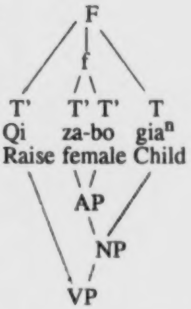
(28).


F
f
f
Ong-ge ga liu-ge
Fat-guy and skinny-guy
N
CONJ
N

'Fatty and Skinny.'

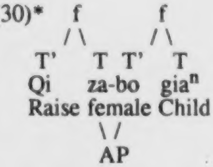
The third syllable *siq* in (26) is recruited by the left-adjacent foot, and the third syllable *lao* in (27) is recruited by the right-adjacent foot, conforming to the JF in (19), since the former is a syntactic right-branching node dominated by the AP and the latter is a syntactic left-branching node dominated by the NP. (28) displays a coordinate structure, where the information of syntactic branching is insufficient to determine the grouping of *ga* in terms of foot phrasing. The JF in (20) then dictates that *ga* be recruited by the right-adjacent foot in cases like this. Furthermore, the JF may also predict a quadrasyllabic Jumbo Foot as (29):

(29)


F
f
T' T' T' T
Qi za-bo gia$^n$
Raise female Child
AP
NP
VP

'Raise a daughter.'

(30)*


f f
T' T T' T
Qi za-bo gia$^n$
Raise female Child
AP

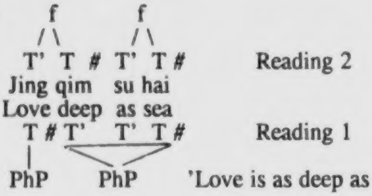
'Raise a daughter.'

In (29), after the ICs of AP form an IC Foot, both the first syllable, *qi*, and the final syllable, *gia*$^n$, join the foot to form a Jumbo Foot. In contrast, the attempted rhythmic structuring in (30) is not metrical, because the four syllables are paired into two feet in a manner which ignores the ICF in (19) by splitting the ICs of AP. Notice that the second and the third syllables, *za* and *bo*, are ICs of AP and subject to the ICF principle. Therefore *qi* and *za* cannot form an AS Foot, neither can *bo* and *gia*$^n$. The ASF applies only when neither syllable is subject to the ICF.

## Metrical-Prosodic Mismatch

So far, we have seen that when tone sandhi operates on prosodic domains, i.e., phonological phrases, it shows one type of reading. When it operates on metrical domains, i.e., feet, it renders another, as illustrated by (31):

(31)

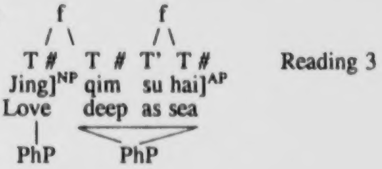

f f
T' T # T' T #
Reading 2
Jing qim su hai
Love deep as sea
T # T' T' T #
Reading 1
PhP PhP

'Love is as deep as the sea.'

There is a clear mismatch between the phrasing of the phonological phrase and the phrasing of the foot in (31). What this means is that the metrical hierarchy and the prosodic hierarchy are independent from one another. The debate over the nature of a prosodic hierarchy has aroused some recent interest among linguists. While others have proposed a single prosodic hierarchy (cf. Nespor & Vogel 1986; Nespor 1990), the Taiwanese evidence in this paper distinguishes two separate hierarchies, specifically, the metrical hierarchy versus. the prosodic hierarchy (also cf. Selkirk 1986; Zec 1988; Inkelas 1989; Kanerva 1989).

In the event of a metrical-prosodic mismatch, both kinds of structures may frequently default to a third alternative pattern of tone sandhi, as in (32):

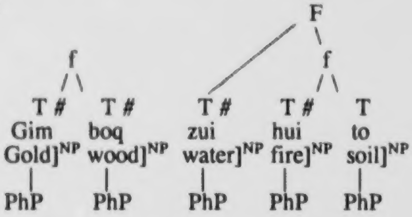
(32)



'Love is as deep as the sea.'

If we look at both structures in (32) carefully, we can see that in this example the prosodic boundaries are imposed on the metrical structure. As a result, there are three syllables in (32) carrying base tones, namely, *jing*, *qim* and *hai*. A question then arises as to whether all prosodic boundaries may be imposed on the metrical structure. (33) shows that the answer is negative:

(33)*



'Gold and wood, water, fire and soil.'

When all the PhP boundaries, or NP boundaries, in (33) default, the derived tone pattern is not well-formed. What distinguish (32) from (33) is that the first PhP boundary in (32) falls on the largest syntactic break, namely the break between NP and AP, while there is no "largest break" of this sort in the coordinate structure of (33). Thus, it becomes clear that only the PhP boundary which coincides with the largest syntactic break may be imposed on metrical structure, thereby deriving the third type of tonal output.

A final remark of the prosodic-metrical mismatch is that when tone sandhi operates on phonological phrases, it results in a speech reading. Conversely, a verse is derived when tone sandhi is subsumed under the domain of the foot. In Taiwanese dialect, there are some pronunciations which are found only in poetic language, and others which are heard only in vernacular conversation. It has come to my attention that syllables with highly vernacular pronunciations are sensitive only to prosodic domains in the light of tone sandhi, but not to metrical domains, as exemplified by (34) and (35):

(34) highly vernacular rendering

PhP
M-bat diu$^{n}$-lang]$^{VP}$#
Not-know father-in-law
T' T' T' T

'Not knowing the father-in-law.'

(35)* f f
/ \ / \
M-bat diu$^{n}$-lang]$^{VP}$#
Not-know father-in-law
T' T T' T

'Not knowing the father-in-law.'

These two examples show that the pronunciation of *m-bat* occurs only in vernacular speech but exhibits no poetic tonal pattern; hence (35) is not acceptable. (36) and (37) then show that the pronunciation of *but-sheq*, 'not-know', which shares the same orthographic characters with *m-bat*, has more alternatives:

(36) Poetic Recitation

f f
/ \ / \
But-seq tai-san]$^{VP}$#
Not-know father-in-law
T' T T' T

'Not knowing the father-in-law: entertain an angel unawares.'

(37) Vernacular Rendering

PhP
But-seq tai-san]$^{VP}$#
Not-know father-in-law
T' T' T' T

'Not knowing the father-in-law: entertain an angel unawares.'

*But-seq* is a poetic pronunciation, and thus can display metrically conditioned tonal properties as in (36). In addition, the entire phrase *but-seq tai-san* is an expression which has already been incorporated into ordinary speech, hence, it also has the alternative tonal behavior in (37). It should be noted that Taiwanese has a great capacity for melting poetic language into common speech, as most poetic expressions may reveal both readings in terms of tone sandhi. Likewise, the more stylized linguistic forms such as folk songs, nursery rhymes, and the like frequently use expressions from vernacular speech, and therefore those expressions may also exhibit both alternative tone patterns. Cases such as (34) and (35) can be expected to be rendered insensitive to metrical domains because they are highly vernacular utterances, and should therefore be able to occur only infrequently, if at all, as poetic recitations. When an utterance is equally influenced by its sensitivity to both prosodic and metrical domains, default readings, like (32), may occur which can be seen as making attempts to average this influence, thus producing the third alternative pattern of tone sandhi, one which is not exclusively based on either of the two domains alone.

To conclude, drawing on the data from Taiwanese speech and verse, I have observed the triangular relationship between syntax, rhythm and tone as the following:

(38)

$$\begin{tikzcd}
& S \arrow[dl, dashed] \arrow[dr] & \\
R \arrow[rr] & & T
\end{tikzcd}$$

As schematized in (38), syntactic structure partially determines tone group formation and influences rhythmic phrasing, and rhythmic structure also partially determines tone group formation. The significance of the two phonological elements, rhythm and tone, is reflected in the independence and interaction of metrical and prosodic categories.

## Footnotes

1. Taiwanese is a Southern Min dialect of Chinese, spoken in Taiwan and on neighboring islands. When this dialect is spoken elsewhere (such as the province of Fugian, etc.), it is called by various names, e.g., Amoy, Hokkian, Xiamen and so on. In spite of slight differences, those regional variants are close enough to be considered a single dialect.

2. The domain of XP is defined as the $X^{max}$ of the head X in terms of standard X-bar theory. Adjuncts are characterized as elements which are not subcategorized arguments of their heads (circumstantials, modifiers, etc.). The notion of c-command adopted by Chen is an early version based on the sisterhood relation. (For further discussion, cf. Chen 1987: pp. 127-145.)

## References

Chen, M. 1984. Unfolding Latent Principles of Literary Taste: Poetry as a Window onto Language. Tsing Hua Journal of Chinese Studies. 16: 203-240.

Chen, M. 1987. The Syntax of Xiamen Tone Sandhi. Phonology Yearbook. (New York: Cambridge University Press.) 4: 109-150.

Chen, M. 1990. What Must Phonology Know about Syntax? The Phonology-Syntax Connection. Inkelas, S. and D. Zec, eds. (The University of Chicago Press). 19-46.

Hsiao, Y. 1990a. A Prosodic-Syntactic Approach to Metricality: Evidence from the Rhythm of Taiwanese Folk Songs. Paper presented at the 16th Annual Minnesota Conference on Language and Linguistics.

Hsiao, Yuchau E. 1990b. "When Syntax Meets Rhythm: Evidence from Folk Songs across Chinese Dialects." Paper presented at the 20th Annual Western Conference on Linguistics. To appear in Proceedings of WECOL '90.

Inkelas, S. 1989. Prosodic Constituency in the Lexicon. (Stanford University.) Ph.D. Dissertation.

Inkelas, S. and D. Zec, eds. 1990. The Phonology-Syntax Connection. (The University of Chicago Press.)

Kanerva, J. 1989. Focus and Phrasing in Chichewa Phonology. (Stanford University.) Ph.D. Dissertation.

Nespor, M. 1990. On the separation of Prosodic and Rhythmic Phonology. The Phonology-Syntax Connection. Inkelas, S. and D. Zec, eds. (The University of Chicago Press.)

Nespor, M., and I. Vogel. 1986. Prosodic Phonology. (Dordrecht Foris.)

Selkirk, E. 1984. Phonology and Syntax: the Relation between Sound and Structure. (MIT Press.)

Selkirk, E. 1986. On Derived Domain in Sentence Phonology. Phonology Yearbook. (New York: Cambridge University Press.) 3: 371-405.

Shih, C. 1986. The Prosodic Domain of Tone Sandhi in Chinese. (University of California, San Diego.) Ph.D. Dissertation.

Shih, C. 1990. Mandarin Third Tone Sandhi and Prosodic Structure. Studies in Chinese Phonology. Wang, J. and N. Smith, eds. (Cornell University and Rutgers University.)

Zec, D. 1988. Sonority Constraints on Prosodic Structure. (Stanford University.) Ph.D. Dissertation.

ESCOL '90 124-135

# THE COMPLEMENT STRUCTURE OF *Tough* CONSTRUCTIONS

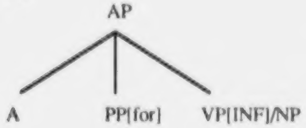
Thomas E. Hukari
University of Victoria
and
Robert D. Levine
Ohio State University

1. INTRODUCTION. There are two relevant species of *tough* construction, which are exemplified by the following data:

(1) *It*$_1$ *is tough (for us*$_2$*)to please Robin.*
(2) *Robin*$_1$ *is tough (for us*$_2$*) to please.*

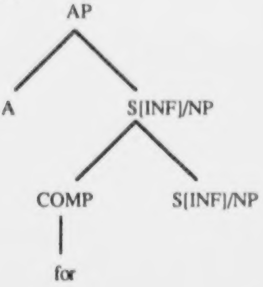
In the ensuing discussion we refer to the NP following *for* in *tough* constructions as $NP_2$ and the matrix subject as $NP_1$. The status of the *for* phrase in such constructions has been much debated. The earliest detailed arguments we are aware of, and probably the most influential, are those given in Bresnan (1971). Bresnan presents three arguments on behalf of an analysis of the APs in (1)-(2) as:

(3)



rather than

(4)



First, note the contrast in acceptability between the examples

(5)a. *It will be tough for at least some students to be in class on time.*
b.**It will be tough for there to be at least some students in class on time.*

If (4) is the appropriate structure for (5)a, there is no reason why one should not get (5)b as well, assuming there-insertion is a cyclic transformation which extraposes the subject and replaces it with *there*. On the other hand, if (3) is the correct structure, then (5)b will never arise.

Second, 'the *for* complementizer of a true sentential complement allows many types of objects which the preposition *for* after *tough* does not' (Bresnan, p.264), as in the following (her 22).

(6)a. *Emmy was eager for that theorem on modules to become known.*
b.**It was tough for that theorem on modules to become known.*
c. *It would surprise me for a book on Hittite to please John.*
d.**It would be tough for a book on Hittite to please John.*

Finally, extraposition constructions with dummy *it* generally correspond to constructions with sentential subjects, but this association breaks down in the cases at hand:

(7)a. *It is hard for Robin to act that way.*
b.**For Robin to act that way is hard.*

Chomsky (1973) and Lasnik and Fiengo (1974) subsequently provide a fourth piece of evidence for the VP analysis as in (3), noting the apparent freedom of movement of the *for* NP sequence, as in examples like

(8)a. *Robin is easy for us to please.*
b. *For us, Robin is easy to please.*
c. *Robin is easy to please, for us.*

This mobility of the sequence supports its analysis as a PP constituent as opposed to clear cases of infinitival complements where the *for* NP sequence cannot be separated from the verb phrase.

(9)a. *We would prefer for Robin to win the race.*
b. **For Robin, We would prefer to win the race.*[1]
c. **We would prefer to win the race, for Robin.*

Work after Bresnan (1971), such as Lasnik and Fiengo, has tended to support the analysis in (3) on the basis of these four arguments, and Jacobson (1987) goes so far as to challenge GKPS's adoption of (4) instead on the grounds that 'it is well known that this analysis of the *tough*-construction is incorrect', citing Bresnan (1971) and Lasnik and Fiengo (1974) and the examples

(10)a.**Bill would be easy for it to bother that Mary left.*
b.**That park is easy for there to be a riot in.*

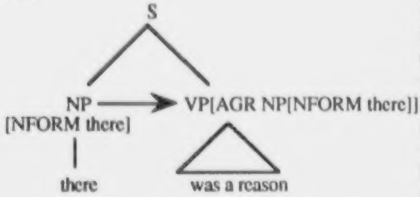
In the Section 2 we offer a critique of the representation (3) for *tough* AP in which we conclude that the evidence for (3) is not particularly compelling. Section 3 provides an alternative, semantic account of the facts, and in Section 4 we show that (4) is, in fact, the more likely candidate for the structure of *tough* constructions such as (2).

2.1. NP$_2$ AS A DUMMY ELEMENT. Bresnan's first argument—the distribution of dummy elements such as *there* in (5)—gives the appearance of carrying over to a nontransformational theory such as GPSG (though see 2.2 below). For example, in Gazdar et al. (1985, hereafter, GKPS), *it* and *there* are encoded as values for a feature NFORM, whose default value is NORM(al), and [NFORM *there*] can only appear if the Feature Specification default NP ⊃ NP[NFORM NORM] is specifically overridden. Certain VPs are licensed by rules in which the mother category is overtly specified as AGR NP[NFORM *there*] and AGR NP[NFORM *it*], as in the following syntactic rule for *be* in the *there*-construction.

(11) VP[AGR NP[NFORM *there*, $\alpha$PLU]] → H[22], NP[$\alpha$PLU]

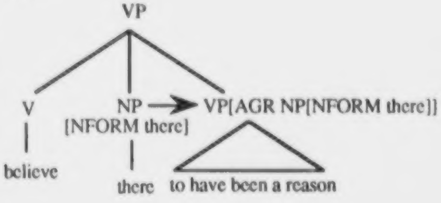
It follows by the Control Agreement Principle (CAP) that any NP which is the controller of such a VP must be specified [NFORM *there*] and dominate the corresponding dummy pronoun. And this non-default specification is 'forgiven' by the default formalism, as the CAP would be violated if the controlling NP were otherwise specified in trees such as the following.

(12)



But the controller of VP in the GKPS framework must be a sister of the controllee, and in the configuration of (3) obviously NP$_2$, as a constituent of PP, is not a sister of VP[INF], hence a non-default specification in NP$_2$ would not be forgiven. On the other hand, in a configuration like (4), there is no reason why NP$_2$ should not be *there*; as subject and controller of a VP specified as VP[AGR NP[NFORM *there*]]. Indeed it must be, thus overriding the default. So Bresnan's first argument appears to carry over to GPSG: if NP$_2$ is the object of *for* and not the subject of an infinitive clause, then we would not expect (5)b to be licensed. But clearly it does not **logically** follow that if we assume instead that NP$_2$ is the subject of an infinitive clause, then (5)b must be grammatical, since there may be other explanations for its ungrammaticality. And, as it turns out, Bresnan's first argument

(13)



must be evaluated in light of her second one, which, in fact, suggests a semantic explanation for the ill-formedness of (5)b.

2.2. RESTRICTIONS ON $NP_2$. Bresnan notes that there are restrictions on $NP_2$ which seem surprising if it simply functions as the subject of an infinitive clause. Consider (14) in light of (15)

(14)%*It would be easy for circumstances to work out against us.*
(15) *I'm not eager for circumstances to work out against us.*

But compare (14) with (16).

(16)a.%*It would be easy for there to be a big misunderstanding about this.*
b.%*It would be easy for it to wind up raining the day of the picnic.*

We have marked these with % as some speakers do not find them all that bad. On the other hand, unquestionably, many speakers find these forms at best awkward and anomalous. But for these speakers (14) is not much better, and examples such as (14) in fact undercut Bresnan's first argument, because it is obvious that the problem here cannot be the **syntactic** distribution of an NP like *circumstances*. Even in terms of the transformational framework in which Bresnan's argument is couched, there is simply no syntactic bar to the appearance of *circumstances* as the head of prepositional objects

(17) *I've been waiting for favourable circumstances before making my move.*

As (17) shows, the problem with (14) vis-à-vis (15) cannot be syntactic, unlike the corresponding case with dummy subjects illustrated in the contrast between (5)b **It will be tough for there to be at least some students in class on time* and, e. g.,

(18) *I am eager for there to be at least some students in class on time.*

Given this patterning, a genuine explanation cannot focus on the role of dummies alone, but rather on the whole range of inappropriate NPs. In the absence of any plausible **syntactic** explanation for the anomalousness of (14), the motivation for the strangeness of the % examples must presumably be sought in some other domain, such as the semantics of *tough* constructions. We return to this point in Section 3 below but, briefly, we suggest that in gapped *tough* constructions such as (2) *Robin is tough for us to please*, the adjective translates semantically as a three-place predicate roughly of the form

(19) **tough′(Robin′, us′, please′(us′, Robin′))**

While $NP_2$ is the syntactic subject of the infinitive, it translates both as an argument of a proposition corresponding to *for us to please Robin* and as an argument of tough', the latter role accounting for the semantic restriction noted by Bresnan.

We conclude, therefore, that nothing about the distribution of dummy pronouns constitutes support for the PP VP characterization of *easy*-adjective complement structure. In short, Bresnan's first two arguments jointly constitute evidence that it is a semantic, not syntactic, property of *tough* constructions which is being reflected in the range of acceptable NPs in $NP_2$ position. The syntax of complementation in these cases must be decided by syntactic evidence, not covert semantic argumentation couched in syntactic terms. We, in fact, offer syntactic evidence for (4) in Section 4 below.

2.3. EXTRAPOSITION. We now argue that Bresnan's third argument, arising from the contrast in (7). repeated here, adds no support for (3) over (4), in spite of her observation that 'the S-Movement criterion is probably the best type for determining simple sentencehood' (p. 265).

(7)a. *It is hard for Robin to act that way.*
b.**For Robin to act that way is hard.*
c.**It would be tough for a book on Hittite to please John.*

There are syntactic reasons to question Bresnan's presumption that extraposability constitutes an adequate test of sentencehood. Consider examples like

$$\text{(20)a.*}\textit{That Robin is a spy} \left\{\begin{array}{l}\textit{seems}\\ \textit{appears}\\ \textit{happens}\\ \textit{turns out}\end{array}\right\}.$$

$$\text{b. }\textit{It} \left\{\begin{array}{l}\textit{seems}\\ \textit{appears}\\ \textit{happens}\\ \textit{turns out}\end{array}\right\} \textit{that Robin is a spy.}$$

Note further that for other verbs, like *develop* in *In the course of our conversation it developed that Robin was a spy*, the sentential subject version of the construction is extremely marginal, if not quite as awful as (20)a. It would be absurd to claim that *That Robin is a spy* is not sentential because the apparently extraposed version of the construction has no sentential subject analogue; why should we then take the parallel resistance of A-filler constructions (for the relevant subclass of lexical heads) to sentential subjecthood as reflecting anything about the phrase structure of the 'extraposed' version?

2.4. MOBILITY OF PP. Consider now the argument from Chomsky (1973) and Lasnik and Fiengo (1974), the presumed mobility of PP in *tough* constructions.

(21)a. *Robin was hard for Kim to talk to.*
b. *For Kim, Robin was hard to talk to.*
c. *Robin was hard to talk to, for Kim.*

An oddity about these 'floating' *for*-PPs is that they can follow the infinitive VP which they seemingly control. Generally a PP must precede the VP it controls (see Sag, 1987).

(22)a. *Perry signalled to Kim to shut the door.*
b. *To Kim, Perry signalled to shut the door.*
c.??*Perry signalled to shut the door, to Kim.*[2]

In any event, such constructions cannot in fact be taken as evidence of an actual displacement of a PP 'controller', since such displaced PPs are found even where they correspond to no source site. The predicate *worth* (*it*) is particularly clear in this respect. We have the following pairs that seem to conform to the pattern manifested in (7):

(23)a. *Robin isn't worth it for me to talk to (about myself).*
b. *For you, Robin isn't worth it to talk to (about myself).*

But the predicted parallelism breaks down completely in the case of *worth*, which, as pointed out by Sam Bayer (p. c.), patterns just like a *tough* predicate except that the non-finite complement must be a gerundive participle:

(24) *Robin isn't worth talking to (*him).*

Note now the pair

(25)a. { *For John, Mary isn't worth talking to (about himself)*
*Mary isn't worth talking to, for John.* }
b. **Mary isn't worth for John talking to (about himself).*

These examples point to separate pre- and postposed *for*-PP positions; somehow these PPs are interpretable in a manner parallel to the PPs which appear between the *tough* adjective head and VP/NP complements as controllers of those complements.

3. THE SEMANTICS OF *TOUGH* CONSTRUCTIONS. We now offer a semantic explanation for the phenomena noted in Bresnan's first two arguments, that NP$_2$ cannot be a dummy element and is (further) semantically restricted. We suggest that *tough* is a three-place predicate in gapped constructions such as (2), and while NP$_2$ is the syntactic subject of an infinitive clause, it functions semantically both as subject of the proposition denoted by that clause and as an argument of the predicate denoted by the *tough* adjective. Thus (2) *Robin is tough (for us) to please* translates roughly as (19), repeated here.

(19) **tough′(Robin′, us′, please′(us′, Robin′))**

And the semantic restriction on NP$_2$ noted in Bresnan's first two arguments derives from its semantic role as an argument of the adjective.

First consider NP$_1$. While NP$_1$ may not seem particularly germane to our account of NP$_2$ the semantics of the two positions seem to interact—a point we return to below—so some brief observations about NP$_1$ seem relevant. It is well known that NP$_1$ shows restrictions in gapped constructions which suggest that this position is not semantically neutral. Lasnik and Fiengo (1974) cite the following examples [their (47)] as evidence against a movement analysis but in a more theory-neutral context, these support our claim that NP$_1$ is semantically salient.

(26)a. *John is being easy to please.*
b.**To please John is being easy.*
c.**It is being easy to please John.*

It is of course the upstairs progressive which forces an interpretation entailing volition on the part of the denotation of NP$_1$, so it need not follow necessarily that *easy* itself assigns a semantic role to NP$_1$.

Similarly, it is possible to attribute volition to the denotation of $NP_1$ with adverbs such as *intentionally*, *purposely*, or *deliberately*, though these cannot occur in the gapless construction (a fact also noted by Lasnik and Fiengo).

(27)a. *Kim was* $\left\{\begin{array}{l}\textit{intentionally}\\ \textit{purposely}\\ \textit{deliberately}\end{array}\right\}$ *hard to deal with.*

b.**It was* $\left\{\begin{array}{l}\textit{intentionally}\\ \textit{purposely}\\ \textit{deliberately}\end{array}\right\}$ *hard to deal with Kim.*

Again this could be due to the semantics of the matrix VP rather than the adjective, but if this were so, we would expect 'raising' adjective constructions to be similar, yet they do not seem to admit this interpretation.

(28) **Kim was* $\left\{\begin{array}{l}\textit{intentionally}\\ \textit{purposely}\\ \textit{deliberately}\end{array}\right\}$ *unlikely to arrive on time.*

Also, such adverbs are possible in the former construction even when *be* is not involved, as in the following (and it is immaterial whether this is analyzed as V NP AP or as a small clause construction).

(31) We $\left\{\begin{array}{l}\textit{consider}\\ \textit{believe}\end{array}\right\}$ *Kim deliberately hard to deal with.*

Further the 'reluctance' of this position to admit idioms, a fact noted by Lasnik and Fiengo, also supports this hypothesis as in the following examples (L&F's 35).

(29)a.**Tabs were easy to keep on Mary.*
b.**Advantage was easy to take of Bill.*
c.**Heed is important to pay to such warnings.*
d.**Attention is difficult to pay to boring lectures.*
e.**The baby would be easy to throw out with the bathwater.*

Note that all of these NPs passivize (e.g., *Tabs were kept on Mary*). While speakers' intuitions about the examples in (29) may vary, this surely reflects the degree of idiomaticity these items have in their personal lexicons.

Lastly, we note difference in meaning between pairs like the following.

(30)a. *It is obnoxious to talk to Kim.*
b. *Kim is obnoxious to talk to.*
(31)a. *It is very unpleasant to talk to Kim.*
b. *Kim is very unpleasant to talk to.*

One can say (a) without believing that Kim possesses properties which make him/her obnoxious or unpleasant. Perhaps Kim's fans are always interrupting. But (b) seems to ascribe the property of obnoxiousness or unpleasantness to Kim.

While we grant that the semantic role of the $NP_1$ position in gapped *tough* constructions is a subtle one, the facts above, taken as a whole, suggest that this is a semantic position with respect to the *tough* adjective. We now turn to the semantics of $NP_2$ and its relationship to $NP_1$.

The hypothesis that $NP_2$ has a semantic role with respect to the *tough* adjective is probably generally accepted, at least for the class of adjectives for which the gapless examples, as in (a) below, are also ungrammatical.

(32)a.**It is hard for there to be children playing in this park.*
b.**This park is hard for there to be children playing in.*
(33)a.**It is easy for there to be a musician playing this flute while balancing a ball on his head.*
b.**This flute is easy for there to be a musician playing while balancing a ball on his head.*

While the ungrammaticality of *there* in $NP_2$ position has been taken as a syntactic fact (cf, our discussion of Bresnan, 1971, above), we have also seen that there are restrictions on non-dummy NPs.

(34)a.*It is *hard for circumstances to repress Kim.*
b.**Kim is hard for circumstances to repress.*
(35)a.**It is hard for Kim's offer to attract competent workers.*
b.**Competent workers are hard for Kim" s offer to attract.*

Clearly $NP_2$ cannot be an inanimate, abstract noun (at least in the context of the adjective *hard*).

Other adjectives seem only to restrict $NP_2$ when $NP_1$ is the 'filler' in a gapped *tough* construction (a fact noted in Bresnan, 1971).

(36)a.*It would be good for there to be children playing in this park.*
b.**This park would be good for there to be children playing in.*
(37)a. *It would be good for circumstances to allow Kim to read this book.*
b.**This book would be good for circumstances to allow Kim to read.*
c. *It would be good for us to allow Kim to read this book.*
d. *This book would be good for us to allow Kim to read.*
(38)a. *It would be good for Kim's offer to attract competent workers into the region.*
b.**Competent workers would be good for Kim's offer to attract into the region.*

We suggest that these facts can be accounted for by assuming that *tough*-type adjectives always denote 3-place predicates in gapped constructions, so (37)b' should translate approximately as

(37)b´.***good´(this-book´,circumstances´, allow´(circumstances´, read´(Kim´, this-book´)))**

and **circumstances´** is not an appropriate argument for **good´**. But in the ungapped construction, the adjectives sort into two types, denoting either one-place predicates (on propositions) as in the rough translation of (37)a:

(37)a′. **good′( allow′(circumstances′, read′(Kim′, the-book′)))**

or two-place predicates (on a proposition and the denotation of $NP_2$) as in (34)a

(34)a′.***hard′(circumstances′, repress′(circumstances′, Kim′))**.

where **circumstances′** is an inappropriate argument for ***hard′***.

Why should gapped constructions be incompatible with denotations involving, say, a two-place predicate (on a proposition and the denotation of $NP_1$)? That is, why shouldn't (37)b translate roughly as follows?

(37)b′. **good′(this book, allow′(circumstances′, read′(Kim′, this-book′)))**

This is an interesting question, and we do not have an answer at this time.

We note in closing this section that the analysis we advocate seems to go counter to compositionality, since we are claiming that $NP_2$ is the subject of a subordinate clause and, while it plays no syntactic role outside that clause, it is a semantic argument of the *tough* adjective. But this hardly counts as an objection against this approach. The only grounds for objecting would be a methodological principle that, all other things being equal, syntactic representations should be as close in form to their corresponding semantic translations as possible. That is, if **easy′** takes an NP-type denotation and a proposition as its arguments, then the corresponding syntax MUST exhibit PP (or NP) and $V^2$ as sisters of the head *easy*. But this methodological presupposition is abundantly counterexemplified. Quantifier scopings, for example, are not restricted to domains corresponding to syntactic distributions; psych-verbs (e.g. *John strikes me as unsatisfied with the offer*) and subject-raising constructions whose semantics correspond to predications on propositions hardly reflect this function/argument structure in their syntax. Thus there seems no empirical warrant for the assumption that the semantics reflects a structurally isomorphic syntax. Nor does the doctrine of compositionality rest on this assumption. The use of meaning postulates, for example, is usually taken to be compatible with a strictly compositional view of the relation between form and meaning, but the use of meaning postulates as in, say, Dowty (1985) hardly reflects this assumption, and in fact the semantics suggested above for *easy*-class adjectives could be easily accommodated via a meaning postulate.

4. SYNTACTIC EVIDENCE FOR STRUCTURE (4). We noted in section 2 that Bresnan's first two arguments for structure (3) seem to involve semantic properties of *tough* constructions. What might constitute genuinely syntactic evidence for (3) or (4)? Clearly, extraction possibilities should give important clues to the distinction between (3) and (4), because extraction from PP is very widely possible in English, while extraction of the subject NP in (4) is ruled out in all current formal syntactic theories. And in fact, when we have an unambiguous PP[*for*], its NP object is extractable:

(39)a. *It would be pleasant for us for you to do the job quickly.*
b. *Who would it be most pleasant for for you to do the job quickly?*

If we apply this test to *tough* constructions, we find in fact that the extraction possibilities reflect, not PP VP complement structure, but rather that in (4):

(40)**Who is it easy for to please Robin?* [3]

Extraction, then, points unequivocally to the structure in (4) as the correct representation of *tough* complementation. An interesting confirmation of this conclusion is the general consensus, contrary to the reservations expressed in Hukari and Levine (1986), that sentences like

(41) *These books were tough for critics of e to praise e sincerely.*

are quite acceptable for many speakers. Note the parasitic gap in *[critics of e]*. It has been generally assumed that the impossibility of sentences like

(42)**Robin was tough for to please Meredith.*

reflects the structure given in (3), which puts $NP_2$ outside the domain of *tough* extraction (see Jacobson 1984 for discussion). But, by the same token, this structure should also be incompatible with the parasitic gap construction in (41). With a sentential analysis of *tough* complements, exactly these facts are predicted. $NP_2$, in infinitive S, is in the domain for *tough* extraction, and there can be parasitic extraction from $NP_2$ if there is a licensing gap, just as gaps are, in general, possible from subjects in English but only if they are parasitic. So both of the following are of course ungrammatical, as there is no licensing gap.

(43)**These books were tough for critics of to praise Mr. McTavish.*
(44)**Which books did Kim say critics of praised Mr. McTavish?*

This analysis also distinguishes between (41) and

(45) **These books were tough for to impress critics of.*

since such examples demand subject NPs exhaustively dominating a gap, and thus are ruled out by the SLASH termination formalism of the theory just as is the following.

(46)*Whose book would you prefer for to impress the critics?

Furthermore, the sentential analysis is completely compatible with the extraction pattern that characterizes the *it*-subject version of *tough* constructions:

(47)a. ??/* Who was it easy for to please Robin?
b. ??Which city is it tough for residents of to get good ice cream?
c. ??That's one city it's tough for residents of to get good ice cream.
d. Detroit is one city it's tough for residents of to feel safe in.

Thus the extraction facts provide rather strong support for the sentential analysis in (4).

Notice that some adjectives permit wh-extraction of $NP_2$.

(48) *Who would it be best for to get the job done quickly?*

Note further that Bresnan (1971), citing Lees for the observation, observes that certain adjectives in fact do seem—by her tests—to permit sentential complements, providing examples like

(49) *It is not good for there to be children involved in such things.*

She notes that the corresponding gapped cases are bad: **Such things are not good for there to be children involved in* (a fact which falls out of our semantic account discussed in section 3). In terms of the analysis argued for here, these cases are to be distinguished from those with heads like *easy* and *tough* strictly in terms of the semantic properties of the heads: *good, useful, appropriate* etc. can denote either a one-place predicate taking propositional argument or a two-place predicate taking a proposition and an NP-type expression (corresponding to a *for*-PP) as its argument. In the former case, the paraphrase for

(50) *It would be good for Robin to get this over with quickly.*

is (i) 'For Robin to get this over quickly would be good', and in the latter the paraphrase is (ii) 'For someone to get this over quickly would be good for Robin'. Clearly the semantics here are somewhat different from those of *easy*, etc. What is particularly important about such examples is they do seem to allow an extraction of $NP_2$, as in example (48). This possibility strongly implies that the adjectives in this class take both $V^2$[INF]—S or VP—and (optional) PP complements. Note, however, that (48) can only be read in terms of paraphrase (ii). The phrase structure corresponding to paraphrase (i) of (50) would then be (4), while (3) represents the structure of the AP giving rise to paraphrase (ii).

In conclusion, it seems clear that the previous literature has not made a compelling case for (3) as the structure in general for *tough* constructions. While we doubt that this paper concludes the debate, we hope to have at least reopened the issue by bringing it to the reader's attention that alternate accounts are compatible with the facts. And, as we have shown in section 4, there is in fact evidence for a sentential analysis as in structure (4).

## FOOTNOTES

---

[1] This and (c) are of course grammatical under another reading where *we* controls the infinitive.

[2] This example may be well-formed if it is interpretable as a case of heavy NP shift, though it strikes us as far worse than final *for*-PP as in (21).

[3] Both (3) and (4) predict the ill-formedness of

i. **Who was Robin easy for to please?*

inasmuch as this example is another example of illegal subject-extraction under the analysis in (4), and in addition constitutes a Nested Dependency Condition (NDC) violation on either account.

## REFERENCES

Bresnan, Joan. 1971. Sentence stress and syntactic transformation. *Language* 47, 257-281.

Chomsky, Noam. 1973. Conditions on transformations. In S. Anderson and P. Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston, 232-286.

Dowty. 1985. On recent analyses of the semantics of control. *Linguistics and Philosophy 8*, 291-331.

Gazdar, Gerald, Ewan Klein, Geoffrey K. Pullum and Ivan Sag. 1985. *Generalized Phrase Structure Grammar*. Cambridge, Massachusetts: Harvard University Press.

Hukari, Thomas E. and Robert D. Levine. 1986. *Generalized Phrase Structure Grammar*: a review article. *Linguistic Analysis 16*.3-4, 135-260.

Jacobson, Pauline. 1984. Connectivity in phrase structure grammar. *Natural Language and Linguistic Theory* 1, 535-581.

Jacobson, Pauline. 1987. Review of *Generalized Phrase Structure Grammar*. *Linguistics and Philosophy* 10, 389-426.

Lasnik, Howard and Robert Fiengo. 1974. Complement object deletion. *Linguistic Inquiry* 5, 535-571.

Sag, Ivan. 1987. Grammatical hierarchy and linear precedence. In Geoffrey J. Huck and Almerindo E. Ojeda (eds), *Syntax and Semantics 20: Discontinuous Constituency*. Academic Press, pp. 303-340.

ESCOL '90 136-153

# FREQUENCY, MARKEDNESS, & MORPHOLOGICAL CHANGE: ON PREDICTING THE SPREAD OF NOUN-PLURAL -*S* IN MODERN HIGH GERMAN--AND WEST GERMANIC

Richard D. Janda
University of Pennsylvania

## 0. Introduction and Overview.

Frequency-data have often been used as indicators of (un)markedness and hence as predictors of morphological change.* In the standard variety of Modern/"New" High German [NHG], for example, there is an extremely high frequency of occurrence for numerous nouns with plurals in -*e*, -(*e*)*n*, *er*, and -Ø (with or without accompanying umlaut).[1] On this basis, one or more of these primarily schwa-based endings might be evaluated as unmarked and predicted eventually to expand its domain at the expense of its rivals--i.e., the rest of the above markers plus less frequent others, including -*s*. Yet a wide-ranging collection of other kinds of evidence from NHG suggests strongly that -*s* is even now the language's unmarked plural-marker and that it is -*s* which will in the future spread most widely to the detriment of its competitors. Moreover, the precedents provided by the much earlier takeover of the plural by -*s* in English and the more recent expansion of plural -*s* in Dutch and Yiddish allow two further predictions. First, there is reason to make the specific suggestion that the main rival of -*s* in NHG plurals will eventually be -*en*. Second, it is possible to formulate a general prediction that, in languages of Germanic type (i.e., ones with predominantly initial stress and many consonant-final roots), -*s* (and certain of its reflexes, like -*z*) will eventually prevail over -Ø and schwa- and/or sonorant-based suffixes with which -*s* competes as a marker of some major morphosyntactic category--even if that -*s* (re)enters such a language primarily via borrowings which are at first relatively infrequent.

## 1. On the General Nature of Markedness and Its Relation to Frequency.

In reconsidering the relationship between frequency and (un)markedness in this regard, we may begin by focusing primarily on the latter--especially since appeals to markedness in the linguistic literature have provoked such polar reactions. How can it be, that is, that some analysts view markedness as an indispensable construct, while a number of other scholars have independently described it (orally, albeit apparently never in print) as "a substitute for thought"? The answer seems to be that there are actually several quite different approaches to--and even definitions of--the phenomenon in question. Thus, among other ways, markedness has been defined: (a) contextually (cf., e.g., Trubetzkoy 1931, 1939$^1$/1949$^2$/1969 and his notion that whatever occurs in neutralization-contexts is unmarked); (b) formally (cf., e.g., Hjelmslev 1935-1937, 1943/1953 and his criterion that categories with a greater number of regular subpatterns are unmarked); (c) conceptually (cf., e.g., Jakobson 1932/1984, 1939/1984 and such suggestions as that the singular is unmarked because its existence is implied by the plural--a collection of singulars); (d) frequentially (in a frequency-based way; cf. above--as well as, e.g., Greenberg 1966a/1966b and his inverse labeling whereby what is more frequent is less marked); (e) biologically (cf., e.g., Chomsky and Halle 1968 and their claim that a preference for certain feature configurations is innately given in human organisms; for further discussion of this and the previous approaches, see now Battistella 1990).

It is the last of these characterizations of markedness which has elicited the strongest criticism. On the one hand, since there is currently no direct evidence for the association of specific genes with particular aspects of language, claims that what is unmarked in language is innately given (or favored) cannot now be empirically verified biologically and so have been called circular or taxonomic (cf., e.g., Ohala 1974). On the other hand, although such claims are often said to receive empirical confirmation from the commonness of some phenomenon across the languages of the world, this then turns out to involve not biology but rather frequency--i.e., approach (d) above. Indeed, while some generativists like Lightfoot 1979:71-80 have followed Jakobson 1941/1968 in advocating that markedness be tested in such domains as language-acquisition, aphasia, dialectology, or diachrony, and while Ohala 1974, 1981, 1983 and others (cf., e.g., Ohala and Jaeger (eds.) 1986) have attempted to ground markedness-like claims in acoustics and the anatomy or physiology of articulation and audition, it is probably still the case that most contemporary discussions of marked vs. unmarked phenomena reduce ultimately to issues of frequency. It thus behooves us to consider closely the work of Greenberg and its primarily frequential approach to markedness.

According to Greenberg 1966a/1966b, markedness is "an empirically given bundle of concurrent phenomena" (p. 62); vis-à-vis a marked member of an opposition, an unmarked category typically exhibits (a greater degree of) one or more of certain properties. These properties are as follows (pp. 25-32): (i) genericity (e.g., for antonymic measure-adjectives of greater vs. lesser extreme in English: *a **long/short** pole* vs. *How **long/?short** is that pole?*); (ii) zero-expression (e.g., for s[in]g[ular] vs. pl[ural] number in English: ***aardvark-Ø*** vs. ***aardvark-s***); (ii) non-syncretism/non-syncretization (e.g., for gender within the sg. vs. pl. numbers of NHG: masc[uline] ***der** Mann* 'the man', fem[inine] ***die** Frau* 'the woman', and neut[er] ***das** Kind* 'the child' vs. non-gender-distinguishing ***die** Männer, Frauen und Kinder* 'the men, women, and children'); (iv) non-facultativity (non-optionality) / "*par excellence*"-interpretation (e.g., for sg. vs. pl. number in Korean: ***kul-Ø*** 'oyster' vs. ***kul(-tul)***--i.e., ***kul-tul*** or ***kul-Ø***--'oysters'--hence ***kul-Ø*** 'oyster' (preferentially) or 'oysters'); (v) (contextual) non-neutralization (e.g., for sg. vs. pl. number in Turkish: ***kitap-Ø*** 'book' vs. ***kitap-lar*** 'books', but *üç **kitap-Ø/*kitap-lar*** 'three books'); (vi) irregularity (e.g., for sg. vs. pl. number in the dative of NHG: masc. ***Bibliothekar-Ø*** 'librarian', ***Schelm(-e)*** 'rogue', ***Narr-en*** 'fool', ***Herr-n*** 'gentleman' vs. ***Bibliothekar-e-n*** 'librarians', ***Schelm-e-n*** 'rogues', ***Narr-en*** 'fools', ***Herr-en*** 'gentlemen'); (vii) non-defectivation (e.g., for active vs. passive voice in Latin: ***am-a-t-Ø/am-ā-t-ur*** 'loves'/'is loved' vs. ***am-ā-v-i-t-Ø/*am-ā-v-i-t-ur*** 'has loved'/'has been loved'--for the latter, instead, periphrastic ***am-ā-t-us est***); (viii) dominance [*taghlīb*] / *ā potiōrī* - agreement (e.g., for masc. vs. fem. gender of articles and adjectives in Spanish: masc. ***el** padre* 'the father', fem. ***la** madre* 'the mother' vs. masc. ***los** padres* 'the parents; father and mother', as well as 'the fathers', and ***el** padre y **la** madre **típicos*** 'the typical father and mother'); (ix) frequency (e.g., for sg. vs. pl. number in French: 743 sg. vs. 257 pl. forms among the first 1,000 nouns in Mauriac's 1928 novel *Le chair et le sang ['Flesh and Blood']*).

Greenberg's 1966a/1966b point in assembling so many indicators of markedness is, to repeat, that: "...[t]he various criteria tend to converge in a large number of cases" (p. 32; for further discussion, cf. also now Croft 1990:64-94). Nevertheless, starting from the situation in phonology, Greenberg suggests that there are reasons to consider frequency as the prime criterion for markedness: "An... important characteristic of unmarked ... categories noted by Trubetzkoy is that of [higher] text frequency" (p. 14). "The phonologic characteristic ... [of] greater frequency of the unmarked member... is likewise subject to straightforward translation ... [in]to the other ["mode[s] of speech"--"grammar and semantics"]" (p. 58). "...[I]t is tempting to adjudge ... [the] role [of frequency] in grammar... [and] semantics as primary" (p. 65). "...[I]t may turn... out that in fact frequency is an adequate unifying principle for the domain of the marked and the unmarked in semantics and grammar...[; if so, then] a great over-all simplification will have been achieved" (p. 70). Now, it is true that Greenberg 1966a/1966b concedes that "frequency is itself but a symptom...[, and that] the consistent relative frequency relations which appear to hold for lexical items and grammatical categories are themselves in need of explanation...[--which] will not, in all, probability, arise from a single principle" (p. 70). Still, Greenberg concludes that "...[t]here are ... advantages to a frequency interpretation of marked and unmarked in grammar and semantics by which marked simply means definitionally less frequent and unmarked more frequent" (p. 67). Chief among the advantages of this determination of (un)markedness essentially just by counting is the fact that, as Greenberg 1966a/1966b:64-70 points out, such an interpretation facilitates several obvious desiderata: (a) the explanation of the other characteristics of (un)marked categories, both synchronically and diachronically (e.g., English *aircraft* can be either sg. or pl., but the greater frequency of the former makes it the default-interpretation); (b) scalability of markedness in terms of gradualizable and quantifiable degrees (e.g., there is increasing markedness for sg. < pl. < dual in Sanskrit); (c) applicability to maximally many linguistic categories and phenomena (e.g., in both phonology and morphology, as well as in syntax and semantics), and (d) crosslinguistic comparability (e.g., frequency obviously reflects the fact that overt indication of the plural is much less marked in English than it is in Korean, where it is optional--cf. above).

Nevertheless, there is an important and actually quite common way in which frequency may not correlate with but in fact be directly opposed to markedness. This divergence concerns the fact that formally marked phenomena usually survive longest in those items which are most frequent and thus most likely to be semantically or functionally unmarked--i.e., to be basic. After all, the forms of English *be* express several central semantic notions (e.g., existence, location, equation, and set-membership), and this functional unmarkedness helps explain why *be* is the most frequently used verb in the language--in fact, according to the figures in Carroll, Davies, and Richman 1971, *be* is the second most common English word, outnumbered only by occurrences of *the*. Still, few (if any) linguists would dare to make the further claim that such extreme frequency allows one to characterize the *am/are/is/was/were*-suppletion of *be* as exemplifying the language's unmarked formal pattern for verb-inflection. Rather, it is presumably only the great frequency of *be* which allows its highly marked forms to survive through time across numerous generations of language-learners and -users. Similarly, the formally unmarked past-tense indicator in English is generally agreed to be -(*e*)*d*, even though ablaut marks past for, e.g., *eat/ate* and more than 100 other high-frequency verbs often assigned to "basic" vocabulary.

As a result of this tendency for highly frequent forms to be resistant to change, however, the emergence of a new morphological rule may often be hidden for a considerable period of time, because such a process normally establishes itself first among semantically less central items which have a relatively low token-frequency. That is, at least some relatively isolated but commonly used irregular forms in language do not start out having those properties (as did, say, English suppletive *went*--which, when transferred from being only the regular past of *wend*, replaced earlier suppletive *ēode* as the past of *go*). Instead, some such irregularities may originate as exemplars of a general, regular pattern (produced by a once-productive morphological rule) and become irregular only when they are overwhelmed by the effects of a newer, competing process--which itself began as a comparativley limited pattern found among less frequent items but has since spread, perhaps via reinterpretation. Thus, for example, the so-called "dental[/alveolar] preterite" of verbs in the Germanic languages (cf. English -(*e*)*d* above) is widely thought to have been an originally minor innovation which eventually ousted the formerly (more) regular ablaut-patterns inherited from Indo-European as the unmarked way to indicate past tense (cf., e.g., Nielsen 1976/1989:30).

But, while it appears possible for a morphological pattern found only among relatively low-frequency words to spread so as to become the unmarked case, instantiated by a general rule, it is clearly much more usual for minor morphological elements occurring only in infrequent words to retain--more or less--that same limited distribution. No linguist is likely to predict, for instance, that the Hebrew-borrowed English plural-marker *-im*, found in a tiny handful of loanwords like *cherub-**im***, *seraph-**im***, and *goy-**im*** (the last of these via Yiddish[2]) will one day expand its domain so mightily as to become the language's unmarked plural-suffix and thereby relegate currently-dominant *-s* to a hundred-odd high-frequency relic-forms (like, say, *part-**s***, *thing-**s***, and *word-**s***).

All in all, then, we cannot rely on frequency as the principal indicator of which morphological patterns are unmarked and hence will probably spread. First, there are certain high-frequency items (like English *be*) which are nevertheless quite marked formally and so appear likely to remain unique; second, there are some low-frequency forms (like Hebrew-loaned plural *-im* in English) that likewise seem quite marked and thus apt to stay isolated, but, third, there also apparently exist other low-frequency patterns (like, presumably, the Germanic dental[/alveolar] preterite at an early stage of its development) which nonetheless eventually begin to spread extremely widely and so must be relatively unmarked. Since we cannot simply read off the (un)markedness of formal elements--and the likelihood of their spread--from frequency-data, though, we must now ask how else (and whether) we can predict the probable future distribution of a given uncommon morphological form. How, e.g., do we distinguish instances of an unmarked, incipiently spreading low-frequency pattern from cases like the highly marked, comparatively static, Hebrew-borrowed English plural-suffix *-im*? Aside from its relatively rarity, that is, which of its properties give *-im* such a high degree of markedness?

## 2. Non-Frequential Criteria for Markedness: Productivity, Doubling, & Environmental Diversity.

The reasons why an element like the English loan-plural *-im* is so far from being unmarked are actually not far to seek: (i) there is no present or foreseeable future trend in English to borrow from Hebrew (either directly or via Yiddish) on a truly massive scale, so the stock of plurals in *-im* cannot be appreciably increased from language-external resources, and (ii) it is demonstrable that not *-im* but *-s* is (still) the productive, default-case plural-suffix of English (cf. the marking of **fax-**im**/fax-**es***, **BDA-**im**/BDA-**s*** [< ***bomb-damage asessment**(-s)*], **glasnost-**im**/ glasnost-**s***, and other forms that have respectively been newly clipped, abbreviated, borrowed from languages other than Hebrew, etc.), so that additional forms with *-im* are unlikely to be available from internal sources, as well. For verbal inflection in the Germanic languages, on the other hand, this second criterion can be used to show that dental[/alveolar]-preterite suffixation had indeed become the unmarked rule for indicating past tense already by the time of the first intensive contacts between Christian missionaries and Germanic tribespeople. Thus, if we take the Old High German [OHG] texts of the eighth century as an illustrative case, it turns out that virtually all borrowed Church Latin verbs (like *pręPdigōn < pr(a)edicāre* 'preach' and *sĕganōn < signāre* 'make the sign of the cross; bless') were nativized with dental[/alveolar] preterites, rather than with ablaut.

Yet, besides continuous heavy borrowing and general productivity, there remain two further factors to be considered in assessing the degree of probability that a given seemingly isolated morphological element found in low-frequency forms will eventually spread and come to be interpreted as resulting from the general rule for indicating a particular category. The first of these considerations is essentially just a criterion which suggests that an element is (more) unmarked to the extent that the environments where it occurs are (more) varied and disparate (cf. the similar notion of "distributional breadth" in Battistella 1990:26-27 et passim and his references). Appearances to the contrary, considerations of frequency (concerning the number of environments) are not necessarily always involved in such cases, since it is possible for a marked form to be distributed in numerous very similar contexts and for an unmarked form to be found in a small number of quite disparate environments. This factor receives its importance from the not uncommon circumstance that several competing markers which indicate the same morphological category may all retain some degree of productivity--subject to differing conditions on their contexts of occurrence--in such a way that it is difficult to pick one form as representing the unmarked, default-case.

For example, in the derivation of English relational adjectives (ones meaning roughly 'having to do with'), the fact that at least the three different suffixes *-ary*, *-(i)al*, and *-ic* are in competition for basically the same semantic domain is shown by their occasional ability to occur after the same preceding morpheme (cf., e.g., *expedi-tion-**ary*** vs. *uncondi-tion-**al*** and *microb-**ial**/-**ic***). Nevertheless, there exist tendencies (of varying strength) for each of these individual suffixes to be specialized for certain morphemic environments: thus, *-ary* is weakly preferred after *-ment* (as in *rudi-ment-**ary**/*-(i)al/*-ic*), while *-(i)al* is strongly preferred after *-ent* or *-ur(e)* (as in *rever-ent-**ial**/*-ary/*-ic* and *conject-ur-**al**/*-ary/*-ic*), and *-ic* is strongly preferred after *-em(e)* (as in *phon-em-**ic**/*-(i)al/*-ary*). Given that *-ary*, *-(i)al*, and *-ic* can all be productively added to at least some new words (cf., e.g., possible *condiment-**ary***, plus the recent linguistic neologisms *discours-**al*** and *templat-**ic***), we must ask whether in such instances it makes sense to recognize (and act on) an obligation to select one of these competing morphological elements which indicate relationality as being (more) unmarked vis-à-vis the others. Or is it preferable to evaluate each of the relevant forms as unmarked for its particular subdomain--and so to give up the idea that one of them instantiates a general rule which represents the default case?

The abovementioned (first) factor which suggests a resolution for such issues has to do with the fact that, in situations where a given morphological category can be indicated by several at least partially productive elements, it often turns out that one form occurs in a much more disparate set of contexts than the others and so can be considered as the "elsewhere"-case--i.e., as the unmarked default, given by a general rule. (This is obviously parallel to the similar situation in phonology, where it is normal to evaluate, say, English [a] rather than [ā] as the unmarked, "elsewhere" allophone of /a/, since--though both are obviously in some sense productive--[a] occurs in a much more variegated set of environments.) Applying this criterion to the English morphological example at hand, we find that it characterizes -(*i*)*al* as less marked than *-ary* and *-ic*, since it is the first of these elements which is found in the most disparate contexts. Thus, for example, -(*i*)*al* occurs after a wide variety of preceding morphemes (cf., e.g., *senat-or-**ial***, *manag-er-**ial***, and *baron-**ial***), is preferred in some environments where *-ary* also occurs (cf., e.g., *emo-tion-**al**/*-**ary*** and *na-tion-**al**/*-**ary*** vs. above *expedi-tion-**ary***), intrudes more often into the usual domain of *-ary* than vice versa (cf., e.g., *element-**al**/-**ary*** vs. above *conject-ur-**al**/*-**ary***), occurs more freely with monomorphemic, especially monosyllabic roots (cf., e.g., *digit-**al***, *nod-**al***, and *form-**al***), and appears to be less tied to Greco-Latin roots than are *-ary* and *-ic* (cf., e.g., the neologisms *sort-**al*** and above *discours-**al***).

That this contextual criterion is on the right track in favoring English -(*i*)*al* as less marked than *-ary* and *-ic* is suggested by the fact that, given additional forms ending in *-ic-al*, the same ranking is indicated for the three suffixes in question by the second additional factor announced earlier. This is the criterion of double (or multiple) marking: if one morphological element is added to another form (or pattern) which already indicates the same category, then the former, apparently redundant element is to be evaluated as (more) unmarked. The validity of such a litmus-test for (un)markedness is borne out by a considerable number of examples (many of them discussed in detail by Janda 1987:445-555) which are of great theoretical interest because they so strongly indicate that the so-called "Elsewhere"-Condition does not govern morphology (although it does seem to hold for phonology--again, cf. Janda 1987:412-432). A particularly striking illustration relevant to the previously discussed case of English past-tense marking by -(*e*)*d* suffixation vs. ablaut is provided (quite apart from well-known child-language data like *went-**ed***) by Wakelin's 1984:80 list of such adult-forms from rural British English dialects as *drunk-**ed***, *spoke-**d***, *stole-**d***, and *wore-**d***--which "show... that dialects may simply add the usual *-d* to the past stem ... to form a new past tense". This instance of doubling via addition of a redundant element clearly converges with the factors mentioned here earlier in indicating that, as a signal of the past tense, the suffix -(*e*)*d* is unmarked, while ablaut is marked.[3] Exactly parallel in import, though, is the abovementioned fact that English morphology involves a substantial number of adjectival forms where both *-ic* and *-al* occur, in sequence and normally in that order. Since final *-al* appears to be redundant in these many words where it follows *-ic* (e.g., obligatorily in *farc-**ic-al***, *index-**ic-al***, and *quizz-**ic-al***, now preferably in *analyt-**ic-al***, *diabol-**ic-al***, *method-**ic-al***, and *Puritan-**ic-al***), it indeed seems that suffixation of *-al* represents the unmarked, default-rule for forming relational adjectives in English--and that this is why speakers are (successfully) tempted to add *-al* to words already sufficiently so characterized by its more marked competitor *-ic*. Hence, even though *-ic* and *-ary* retain some degree of productivity, we may predict that -(*i*)*al*, as the (more) unmarked form suffixed by the (more) general rule, is likely in the future to spread at the expense of its rivals. (For further discussion of English relational adjectives--though without the present diachronic predictions--see Szymanek 1989:213-238 and references there.)

Summarizing the points made here so far, then, we can conclude that it is indeed invalid to take frequency as the primary--let alone the sole--indicator of markedness for elements (or patterns) of morphological form. On the one hand, equating unmarkedness with commonness runs afoul of the well-known tendency for even extremely anomalous morphological patterns to survive in highly frequent words and thereby leads to drastically counterintuitive predictions like the abovementioned one that suppletive *be* is the formally most unmarked verb in English and hence most likely to serve as a model for analogical change in other verbs. On the other hand, though, unmarkedness cannot be equated with infrequency, either, since many uncommon morphological elements and configurations are also quite anomalous and show no tendency to spread to other words (e.g., the Hebrew-borrowed plural-suffix *-im* of English). Instead, three non-frequential markedness-related factors--the often-applicable and usually-converging criteria of productivity, diversity of environments, and double marking--seem to make the correct prediction that some (but not all) low-frequency items may often be the primary or even the exclusive locus of a morphological form or pattern which is unmarked and can therefore be expected to expand its domain (cf., e.g., the English relational-adjective suffix *-al*). However, we earlier observed that, in sets of competing elements, both less and more marked forms may still be productive (recall English *-(i)al* vs. *-ic* and *-ary*), and it must further be conceded that double marking (like *-ic-al* in English) is neither ubiquitous nor uncontroversial. It thus appears that the occurrence of a particular morphological element or configuration in a much more disparate variety of environments (as the general-rule default-case) vis-à-vis its competitors may well be the most reliable indicator of unmarkedness and the best predictor of which forms and patterns will eventually spread.

Of course, it would be preferable if the diachronic part of this hypothesis could already be tested against well-studied instances where it is known not only that some morphological element has become the unmarked regular case but also that the form in question was originally found only in low-frequency words. Unfortunately, while there obviously exist numerous contemporary examples where the unmarked, default-status of some general pattern can be determined beyond any doubt (cf., e.g., the abovementioned English past-tense suffix *-(e)d*), the ultimate origins of most such phenomena remain obscure. Precisely in the case of the English *-(e)d*, for instance, we have nothing more than speculative reconstructions of how its etymon must have originated in Proto-Germanic or Proto-Indo-European, and rival "(new) theories of the dental[/alveolar] preterite" are proposed, dismissed, revised, and resuscitated with depressing regularity (and frequency). Thus, although contemporary studies can prove that the set of verbs which employ regular past-tense *-(e)d* marking include by now some of the most common words in English (such as *call(ed)*, *use(d)*, *look(ed)*, *ask(ed)*, and *want(ed)*, all among the 200 most frequent items in Carroll, Davies, and Richman 1971), we really have no idea of how frequent the Germanic dental[/alveolar] preterite was when it first emerged with roughly its current function.

Rather, the best test that can currently be carried out concerning the validity of environmental diversity and the other non-frequential markedness-related criteria discussed above (especially as predictors of language-change) would seem to involve: (i) finding a contemporary morphological form or pattern which occurs in a contextually diverse set of low-frequency words and (ii) waiting to see whether the predicted spread of such an element actually begins to take place. The verification of this kind of hypothesis will clearly take longer than a single generation or even an entire lifetime, but, for all that, it will be not a reconstructive, speculative verification but a truly empirical one--and so well worth the wait. After all, the so-called "Uniformitarian Hypothesis" is more a solution of desperation than something to be proud of: the point of carrying out detailed analyses of contemporary linguistic phenomena now is surely not so much in order to have a basis for extrapolation from our time back into the relatively unknown past as it is to relieve future researchers of the need to extrapolate back from their time to our well-described present. It is in this sense that the most valuable legacy which we can bequeath to later diachronic (and synchronic) linguists is a maximally complete analysis and description of those current linguistic phenomena that we believe most likely to undergo eventual change.

Considering our current specific case--where we seek to test the prediction that occurrence in disparate environments is a more crucial determinant for the (un)markedness of a morphological form than is word-frequency--from the perspective just delineated, we may choose the example of NHG noun-plural *-s* as particularly apt for verifying the hypothesis here at issue. To wit, NHG is a relatively well-described living language (indeed, a flourishing one) in which the so-called "minor" plural-suffix *-s* occurs on a contextually diverse set of low-frequency nouns. Furthermore, since that nominal number-marker seems to have gained its foothold in the language exclusively via borrowings, we have an excellent chance to compare whether NHG *-s* will remain relatively fixed and isolated in its domain (as the Hebrew-borrowed plural-suffix *-im* has done in English; cf. above) or else expand its domain to new words, including native NHG ones (as this same Hebrew-borrowed plural *-im* has done in Yiddish; again, cf. above). That is, as already mentioned earlier, relatively continuous and large-scale borrowing seems to be a common and significant factor which promotes expansion rather than fossilization in cases where a relatively new morphological pattern enters a language via loanwords. Based on all this, then, we predict that NHG plural *-s*, even though it now appears only on words which are comparatively infrequent, actually represents the unmarked, general-rule default-case and therefore will eventually spread to numerous other nouns--at the expense of several other NHG plural-suffixes which presently occur on much more common words. In order to assess both the correctness of making this prediction and also the probability that it will be borne out by future changes, however, we must now consider the full range and the relative frequencies of the indicators for plural on NHG nouns.

## 3. Frequency as a Criterion for Comparing the Markedness of the Plural-Markers for NHG Nouns.

As already mentioned at the outset of introductory Section 0 above, NHG has several sorts of nominal plural-marking. For example, umlaut (i.e., fronting of a root-vowel) sometimes marks plural by itself but most often cooccurs with suffixation. Where umlaut is indicated by " ¨ ", the major NHG plural-makers can be given as follows: *-(e)n*, *-e* or *¨-e*, *-er* or *¨-er*, -Ø or ¨-Ø, and *-s*. If frequency were to be used as the sole or primary criterion for arranging these markers along a scale from least marked to most marked, then one would quite probably evaluate *-s* as the most marked plural-suffix in the language, since an enormous number--in fact, the overwhelming majority--of highly frequent, semantically basic NHG nouns still mark plural not with *-s* but via one of the schwa-containing suffixes (with or without a following sonorant consonant) or zero.

This can be demonstrated convincingly on the basis of frequency-data for NHG like those presented by Pfeffer 1960, who draws on a corpus of nearly 600,000 words collected during more than 400 taped interviews (for further discussion, cf. also Pfeffer 1975). Of the 200 most common NHG nouns in this sample (with frequencies from 1,518 down to 64), nearly 42% have plurals in *-(e)n* (like fem. *Frau-**en*** 'women', *Zeit-**en*** 'times', or *Farbe-**n*** 'colors', masc. *Mensch-**en*** 'humans' or *Bauer-**n*** 'farmers', and neut. *Ende-**n*** 'ends'; cf. also neut. *Bett-**en*** 'beds'), fully 35% have plurals in *-e* (23.5% like neut. *Jahr-**e*** 'years' or *Spiel-**e*** 'games' and masc. *Tag-**e*** 'days' or *Arm-**e*** 'arms'; cf. also fem. *Kenntnis(s)*-e '[pieces of ]knowledge') or *¨-e* (11.5% like masc. *Gründ-**e*** 'reasons' and fem. *Händ-**e*** 'hands'; cf. also the unique neut. *Flöß-**e*** 'rafts'), over 12% have plurals in -Ø (9.5% like masc. *Lehrer-**Ø*** 'teachers', neut., *Leben-**Ø*** 'lives', and the unique fem. *Mark-**Ø*** 'deutschmarks') or ¨-Ø (3% like masc. *Väter-**Ø*** 'fathers', fem. *Mütter-**Ø*** 'mothers', and the nearly unique neut. variant*Wässer-**Ø*** 'waters'), and almost 10% have plurals in *-er* (3% like neut. *Kind-**er*** 'children'; cf. also masc. *Geist-**er*** 'spirits') or *¨-er* (6.5% like neut. *Dörf-**er*** 'villages', masc. *Männ-**er*** 'men', and the unique--facetious--fem. variant *Märk-**er*** 'deutschmarks').

Nevertheless, just 1% (i.e., 2 items) out of this sample of the 200 most frequent words in NHG have standard plurals in *-s*: viz., neut. *Auto-**s*** and *Hobby-**s***--only the 115th and 134th most common nouns in Pfeffer's corpus, with frequencies of 101 and 86, respectively. In addition, 2.5% of the words in the corpus allow non-standard *-s* plurals (as in the colloquial masc. variant *Jung-**s*** 'boys, lads, guys' and the children's-language diminutive *Mutti-**s*** 'mommies'). Still, the number of nouns in this sample whose plural can be marked by *-s* is actually so small that even their combined percentage (1% standard + 2.5% non-standard = 3.5% total) turns out to be just barely higher than that for nouns which cannot appear in the plural (the 3% made up of instances like fem. *Jugend* 'youth(fulness)', neut. *Fernsehen* 'television (as an institution)', and masc. *Verkehr* 'traffic').[4] Consequently, if a ranking as to unmarkedness for *-s* vis-à-vis the other NHG plural-endings were to be based entirely on considerations of frequency evaluated in terms of a point-range from 10.00 down to 0.00, then that sibilant suffix would be placed last on a scale arranged from most to least unmarked roughly as follows (where umlaut-variants are not counted separately):[5] *-(e)n* = 4.15, *-e*

= 3.50, -Ø = 1.25, *-er* = 0.95, *-s* = 0.35 or even 0.10. On such a hierarchy, there is little doubt that -s is the most marked indicator of noun-plurality in the language, while *-(e)n* is most unmarked--followed closely by *-e*, with -Ø and *-er* more or less in the middle.

The ranking just given follows from a frequential reckoning of markedness carried out by determining which plural-suffixes are selected most commonly by those (200) nouns that have the highest token-frequencies in NHG. Interestingly, though, essentially the same result emerges if one makes a frequential calcuation of markedness by ranking the type-frequencies of the various plural-suffixes used for those NHG nouns which seem to be semantically most basic--and hence unmarked--on the basis of their occurrence in the 200-word version of the so-called "Swadesh-list" (for discussion of the latter, cf., e.g., Bynon 1977:266-272 and references there). That is, without conceding any particular validity to the specific tenets of glottochronology (such as the much-disputed assumption that basic vocabulary is replaced at a constant rate), we can simply consider which plural-markers occur most commonly with the approximately 87 NHG instantiations of the nouns in the list of proposed "core" vocabulary-items so often employed for interlinguistic and interdialectal comparative purposes (cf., e.g., Ringe 1990-MS). When this is done, the frequencies turn out to be distributed as follows: 39% of "core"-/"basic" nouns have plurals in *-e* (22%) or ¨*-e* (17%); 28% have plurals in *-(e)n*; 17% have plurals in -Ø (11%) or ¨-Ø (6%), 11% have plurals in *-er* (3%) or ¨*-er* (8%), 0% (none) have plurals in *-s*, and 8% have no plurals at all.[6] The two leading suffixes *-(e)n* and *-e* have switched places here--in comparison to the earlier unmarkedness-ranking based ultimately on token-frequencies--but *-s* again comes in last on a scale from most to least unmarked where places are assigned according to scores ranging from 10.00 down to 0.00: *-(e)n* = 3.90, *-e* = 2.80, -Ø = 1.70, *-er* = 1.11, and *-s* = 0.00.[7]

It should be emphasized that this second frequential way of evaluating markedness (here, for the different NHG plural-suffixes) is independent of the first way both in principle and in practice, mainly because it turns out that the "core"-vocabulary words of the "Swadesh-list" need not have a particularly high token-frequency. Thus, for example, of the 87 semantically/culturally "basic" NHG words which instantiate the nouns of the 200-item version, only 16 are among the 87 most common nouns in the abovementioned 600,000-word corpus of Pfeffer 1960, 1975. In fact, just 23 of these "core"-words are among the 200 most frequent nouns in the language, and only 37 are among the 1,300 most common ones. Nevertheless, the "Swadesh-list" seems--at least for NHG--to be a great success in achieving its goal of targeting words which tend to be highly resistant to replacement and change. Of the approximately 68 NHG verbs which the list elicits as "basic" words, for instance, fully 64% are forms which indicate the preterite solely via the older device of ablaut (i.e., are so-called "strong" verbs like ***trink-en/trank*** 'to drink'/'drank'), while only 36% are items which employ the newer dental[/alveolar]-preterite suffix (i.e., are so-called "weak" verbs like *atm-en/atm-**ete*** 'to breathe'/'breathe-**d**'). For the 57 verbs in the "basic" vocabulary of Modern English, too, it is similarly--albeit less lopsidedly--true that there are more irregular verbs (51%--primarily ablauting ones) than items with dental[/alveolar] preterites in *-(e)d* (49%).

On the other hand, though, these very facts immediately call into question the validity of basing any evaluations of (un)markedness on frequencies associated with "basic" vocabulary. That is, since we know with relative certainty that the ablauting verbs of NHG constitute the marked case and that dental[/alveolar]-preterite verbs represent the unmarked, general-rule default-case (parallel to what was already concluded above for English), the predominance of "strong" verbs in the NHG instantiation of the "Swadesh-list" emphatically suggests that such "core"-vocabulary can be so resistant to change that it may consist mainly of relatively marked fossil-forms which do not reflect the most general--i.e., unmarked--patterns of a language. And, if this conclusion is valid for verbal morphology, then there is no reason to doubt that it also holds for the morphology of nouns, as well. As a result, we are well advised not only to drop the type-frequency of the various nominal plural-suffixes for "basic" NHG words as a criterion for evaluating their relative markedness but also to reconsider the token-frequency-based considerations introduced earlier. Such reconsideration turns out to be well-advised, because the previously consulted 600,000-word corpus of

Pfeffer 1960, 1975 likewise shows a predominance of verbs with an ablauting past-tense over those with a dental[/alveolar]-preterite.

Thus, for example, if we make our calculations by focusing on the set of NHG verbs which possess frequencies greater than or equal to those of the 200 most common nouns of NHG (i.e., from 21,036 down to 64), then we find that, of these 135 verbs, 58% have ablaut in the past, whereas only 48% have a dental[/alveolar] preterite. If we consider the 200 most common verbs in the language (with frequencies down to 47), then the proportion shifts slightly in favor of non-ablauting forms: namely, 53.5% of these verbs have a dental[/alveolar] preterite, while 46.5% show past-tense ablaut. Still, for the 100 most common NHG verbs (with frequencies down to 92), a solid 54%-majority of the items have ablauting pasts, whereas only 46% make use of a dental[/alveolar] preterite. Consequently, if markedness is to be determined primarily on the basis of frequency, then we must conclude that, as indicators of the past tense in NHG, neither ablaut nor the dental[/alveolar] preterite is appreciably more (un)marked than the other. However, a strong conviction has repeatedly been expressed above that ablaut is the marked past-tense pattern of NHG, while the dental[/alveolar] preterite represents the unmarked, general-rule default--an evaluation which is supported by the fact that ablaut is no longer productive in NHG, whereas verb-roots borrowed from English may uniformly receive a dental[/alveolar] preterite (cf., e.g., *beam-**te*** 'beam-ed (down)', *hitchhike-**te*** 'hitchhike-d', *interview-**te*** 'interview-ed', *manag(e)-**te*** 'manage-d', etc.). We must now indeed conclude that absolute frequency, too, is unreliable, potentially misleading, and therefore invalid as the prime determinant of (un)markedness. Most importantly, if a purely frequential approach yields the wrong results when used as the way to evaluate the relative markedness of two formal means for indicating past tense in NHG, then absolute frequencies of noun-occurrence like those presented here earlier (on the basis of Pfeffer's 1960, 1975 corpus) cannot be relied on for purposes of ranking the comparative markedness of the NHG nominal plural-suffixes *-(e)n*, *-e* or ¨*-e*, *-er* or ¨*-er*, -Ø or ¨-Ø, and *-s*.

## 4. Productivity, Doubling, & Environmental Diversity vs. Noun-Plural Markedness in NHG.

This being the case, though, we are now obliged to set aside the frequency-data established above for the various noun-pluralizing suffixes of NHG and must instead turn to other markedness-related criteria--like those elaborated in Section 2: (i) productive application to at least one open class of new items, (ii) double (or multiple) marking, and (iii) diverse contexts of occurrence. Of these three factors, productivity yields only ambiguous and so at best unreliable results, since at least four of the NHG plural-endings here at issue are extremely productive. Although *-er* (if really different from ¨*-er*; recall Footnote 5) and the three umlaut-accompanied endings ¨*-e*, ¨*-er*, and ¨-Ø are now only rarely used to pluralize novel noun-forms (but at most show a sporadic tendency to spread occasionally to existing nouns), new plurals in *-(e)n*, *-e*, -Ø, and *-s* are formed quite commonly and in great numbers. The crucial element in this situation is that each of those four endings is associated with at least one nominal suffix which is itself extremely productive. Thus, for example, *-(e)n* nearly always indicates plural for nouns ending in the agentives *-ent*, *-ist*, and *-or* (cf., e.g., *Assist-ent-**en*** 'assistants', *Cembal-ist-**en*** 'cembalists' and *Reformat-or-**en*** 'reformers'); *-e* pluralizes nominal forms which terminate with the suffixes *-är* and (non-nasalized) *-ment* (as in *Milliard-är-**e*** 'billionaires' and *Funda-ment-**e*** 'foundations'); -Ø plurals occur with singular nouns formed with the agentive-ending *-er*, even foreign ones (so that -Ø is found, e.g., in both *Mach-er-**Ø*** 'doers; movers and shakers' and *Comput-er-**Ø*** 'computers'), and the plural-suffix *-s* is added to--among others--the French-borrowed (nasalized) ending *-ment* (as in *Evene-ment-**s*** 'events').

Given that the markedness-criterion of productivity results in more or less of a tie between the four NHG noun-pluralizers *-(e)n*, *-e*, -Ø, and *-s*, it is fortunate that the further criterion of double marking unambiguously shows *-s* to be the language's (most) unmarked plural-suffix. This conclusion follows from the fact that, as emphasized by Plank 1981:77 [in my translation--RDJ], "the inflectional affix *-s* of the plural is also pleonastically ... combined with nouns already inflected for plurality" by means of its rival suffixes *-(e)n* or *-e*, as in *Junge-**n-s*** 'boys, guys', *Bub-**en-s*** 'lads, guys', ***Dame-n-s*** 'ladies, gals', ***Frau-en-s*** 'women, gals', ***Kerl-e-s***--"even with inflected loanwords" which bear foreign plural-suffixes, such as ***Exam-ina-s*** 'examinations, tests' and ***Komma-ta-s*** 'commas'. Indeed, Plank 1981:76 points out that the discovery of similar cases lead Paul $1880^1/1920^5/1970^8$:163 to posit essentially the same (un)markedness-principle of double-marking as that assumed here: "With exceptional frequency, words which are formed in a less usual way are extended via the addition of the suffix which represents the normal way of forming them" [my translation--RDJ]. On the basis of this criterion, the suffix *-s* must unmistakably be judged--despite its limitation to relatively infrequent nouns--as the (most) unmarked indicator of nominal plurality in NHG. In this regard, it is significant that the language shows no trace of the opposite phenomenon--whereby an additional plural-suffix *-e* or *-(e)n* would be added pleonastically to *-s*--and that there are therefore no double plurals of the type ****Auto-s-e(n)*** 'cars' or ****Hobby-s-e(n)*** 'hobbies'. (Rather, the closest thing to such a situation which exists in NHG occurs only under the quite different circumstance that, when borrowed nouns which are already plural are reinterpreted by German-speakers as being singular nouns ending in *...s*, they often have a -Ø plural; cf., e.g., ***Blues-Ø*** 'blues'.)

Even without this clear evidence from double marking, however, it would still be possible to determine just from the criterion of of environmental diversity that relatively low-frequency *-s* is the (most) unmarked NHG plural-suffix and so is (most) likely in the future to spread at the expense of its competitors. Basically, it is simply the case that none of the other plural-endings in the language can match the farrago of nominal contexts in which *-s* appears.

(I) First of all, the NHG morphological rule of plural-marking via *-s* suffixation is particularly favored in its application when a given noun which is to be pluralized meets the major phonological condition(s) of being a polysyllabic form ending in a vowel other than schwa. (A) This is especially true for native nouns: if their singular form has two or more syllables and ends in a vowel other than schwa, then they usually take plural *-s*.[8] Within this generally characterized set of words, however, a number of significant subtypes can be distinguished.

(1) Many of these non-schwa vowel-final polysyllabic nouns are full (i.e., have not undergone shortening in any way such as by abbreviation, acronymy, or clipping). (a) The stress on most forms of this sort falls sometimes on their penultimate syllable (instances of which are here indicated with an acute accent) but more often on their inital syllable (not indicated here unless subject to stress-variation); in either of these cases, the plural *-s* which is added to such words follows a (final) vowel which is unaccented. (i) While words of this type are not numerous, a few of them nevertheless occur in formal adult-language: e.g., ***Hali-s*** 'horn-sounds', ***Juli-s*** 'Julys'; ***Húrra-s*** 'hurrahs, cheers'; ***Juno-s*** 'Junes' [bureaucratic]; ***Uhu-s*** '(eagle-)owls'. (ii) But *-s* plurals are much more conspicuous in caretakers' speech to young children--and in the related language-variety of lovers' "sweet" talk--because these registers contain many polysyllabic forms whose singular ends in an unstressed vowel other than schwa: e.g., ***Hottehü-s*** 'giddy-up horses'; ***Bubi-s*** 'laddies', ***Hansi-s*** 'Johnnies', ***Mutti-s*** 'mommies', ***Schnucki-s*** 'lambkins', ***Vati-s*** 'daddies'; ***Wehweh-s*** 'ouch-ouches, hurt places'; ***Mama-s*** 'mamas', ***Papa-s*** 'papas', ***Oma-s*** 'grammas', ***Opa-s*** 'grampas'; ***Hotto-s*** 'giddy-up horses', ***Popo-s*** 'bottoms, buttocks'; ***Nackedei-s*** 'nudies, naked children', ***Wauwau-s*** 'bow-wows'. (iii) Similarly, the *-s* suffix occurs with at least one slang-term which ends in a non-schwa vowel: ***Hallódri-s*** 'rogues', as well as in colloquial color(-name) plurals like ***Lila-s*** 'lilacs' and ***Rosa-s*** 'pinks'. (b) But yet other vowel-final full forms which take the *-s* plural are formal adult-words whose singulars bear final stress (here marked with acute accent): e.g., ***Hurrá-s*** 'hurrahs, cheers', ***Halló-s*** 'hellos, cheers', ***Juléi-s*** 'Julys' [bureaucratese].

(2) A much more numerous set of *-s* plurals occurs with nominal forms that have arisen via shortening of originally longer words or constructions. (a) For example, there is a large number of items which, through acronymy or clipping, come to end in an unstressed non-schwa vowel (occasionally by outright addition of, or change to, *-i*) and so are pluralized with *-s* (regardless of the plural-suffix found on their longer source). (i) Many such shortened words are in standard usage: e.g., ***Atü-s*** 'excess atmospheric pressures' (< ***Atmosphärenüberdrück(-e)***); ***Kombi-s*** 'station-

(combination-)wagons' (< ***Kombi***(*nations*)*wagen*(**-Ø**)), *Nazi-s* 'National Socialists' (< ***Nationalsozialist***(**-en**)); *Dia-s* '(photographic) slides' (< ***Diapositiv***(**-e**)), *Sank*(*r*)*a-s* 'military (sanitary) ambulances (vehicles)' (< ***Sanitätskraftwagen***(**-Ø**)), *Stuka-s* 'stuka( dive-bomber)s' (< ***Sturzkampfflugzeug***(**-e**) 'dive-fighting(/-bombing) aircraft'); *Auto-s* 'cars' (< ***Automobil***(**-e**)), *Judo-s* 'Young (Christian) Democrats' (< ***Jungdemokrat***(**-en**)), *Juso-s* 'Young Social Democrats' (< ***Jungsozialist***(**-en**)), *Kino-s* 'cinemas' (< ***Kinematograph***(**-en**)), *Vopo-s* 'policemen' (formerly East German; < ***Volkspolizist***(**-en**)); *Akku-s* 'accumulators' (< ***Akkumu- lator***(**-en**)); *Tax*(-)*i-s* 'taxis' (< ***Taxameter***(**-Ø**)). (ii) Yet other shortened words, though, still have the status of belonging to the domain of non-standard colloquial speech or slang: e.g., *Ami-s* 'Yanks, Americans' (< ***Amerikaner***(**-Ø**)), *Bibi-s* 'stovepipes, beaver-skin (top) hats' (< ***Biber***(**-Ø**) 'beaver(s)'), *Chauvi-s* '(male) chauvinist( pig)s' (< ***Chauvinist***(**-en**)); *Dreh-s+*[9] 'tricks, dodges'; *Heini-s* 'guys; fools' (< ***Heinrich***(*-s*) 'Henry(s)'), *Idi-s* 'idiots' (< ***Idiot***(**-en**)), *Krimi-s* 'whodunnits, thrillers' (< ***Kriminal***(-)*roman*(**-e**)/(-)*film*(**-e**) 'crime-novel(s)/-movie(s)'); *Klo-s* 'johns, bathrooms' (< (*Wasser*)***Klosett***(**-s+**) 'watercloset(s)'), *Sozi-s* 'pinkos, socialists' (< ***Sozialist***(**-en**)), *Uni-s* 'U's, universities' (< ***Universität***(**-en**)); *Demo-s* 'demonstrations' (< ***Demonstration***(**-en**)), *Foto-s* 'photos' (< ***Fotographie***(**-n**)), *Kripo-s* 'cops, police-departments' (< ***Kriminalpolizei***(**-en**) 'criminal police'), *Limo-s* 'cokes, soft drinks' (< ***Limonade***(**-n**) 'lemonade(s), soft drink(s)'), *Schupo-s* 'cops, policemen' (formerly West German; < ***Schutzpolizist***(**-en**)), *Trafo-s* 'transformers' (< ***Transformator***(**-en**)); *Spont*(-)*i-s* 'spontaneous people (demonstrators?)' (< ***spontan-e*** ... [?] 'spontaneous (ones) [?]'), *Wohn*(-)*i-s* 'apartment-/house-mates' (< ***Wohngemeinschaftsgenosse***(**-n**) 'living-community comrade(s)'). (b) There are abundant final-stressed letter-by-letter abbreviations, too, which--because nearly two thirds of the NHG names for letters end in vowel-sounds--yield nouns whose singulars end in a stressed vowel: *AG-s* 'joint-stock companies' (< ***Aktiengesellschaft***(**-en**)), *MG-s* 'machine-guns' (< ***Maschinengewehr***(**-e**)), *K.o.-s* 'K.O.'s, knock-outs' (a nativization of Engl[ish] ***K.O.***(*-s*) < ***Knockout***(**-s**)), *PKW-s*/*Pkw-s* 'cars' (< ***Personenkraftwagen***((**-Ø**) 'person(al) vehicles'), *TH-s* 'technical colleges' (< ***technische Hochschule***(**-n**)), *TU-s* 'technical unversities' (< ***technische Universität***(**-en**)).

(B) Actually, though, most full nouns which have non-schwa final vowels and whose plurals are marked by *-s* are loanwords--from quite a variety of languages. (1) A substantial number of these borrowings thus end in a stressed vowel (here not indicated by any accent-diacritics), like those in following sample (where the immediate donor-languages seem to be as follows--French for 24 words; Turkish for 2, and English, Spanish, and Tongan for 1 each): *Aperçu-s* 'witty remarks', *Menü-s* 'menus'; *Milieu-s* 'milieus'; *Etui-s* 'cases, containers', *Glaci*(-)*s* 'glacis(es), fortification-slopes' [where orthographic <*s*> is pronounced only in the plural], *Kroki-s* 'sketch-maps', *Trainee-s* 'trainees'; *Ade-s* 'good-byes, farewells', *Bankier-s* 'bankers' [with an unpronounced orthographic consonant before *-s*, as elsewhere in this list], *Bouquet-s+* 'bouquets', *Café-s* 'cafes', *Essai-s* 'essays', *Gelee-s* 'jellies', *Porträt-s+* 'portraits'; *Dolma-s* 'dolmas (Turkish foods)', *Ulema-s* 'Islamic (legal) scholars'; *Büro-s* 'offices', *Paletot-s* 'loose overcoats', *Niveau-s* 'levels'; *Rendezvou*(-)*s* 'rendezvous', *Tabu-s* 'taboos'; *Detail-s* 'details'; *Kakao-s* 'cocoas'--and, with borrowed (final) nasal vowels: *Parfum-s+* 'perfumes'; *Dessin-s* 'designs', *Terrain-s* 'terrains'; *Abonnement-s+* 'subscriptions', *Restaurant-s* 'restaurants'; *Balkon-s+* 'balconies'. (2) Nevertheless, many loanwords with *-s* plurals end in an unstressed vowel--like those which follow (where the immediate donor-languages seem to be as follows--English and Spanish for 4 each, French and Italian for 3 each, Arabic for 2 , and Australian, Greek, Japanese, Polish, Portuguese, Turkish, and Xhosa for 1 each): *Baby-s* 'babies', *Kadi-s* '(Islamic) courts', *Kólibri-s* 'hummingbirds', *Oldie-s* 'oldies (songs)', *Rallye-s* 'car-rallies, -races', *Zloty-s* 'zlotys (Polish currency-units' [vs. real Polish *zlot-e*]; *Faksímile-s* 'facsimiles', *Jockei-s* 'jockeys', *Káffee-s* 'coffees' (the more common variant, nativized with initial stress); *Amerika-s* 'Americas', *Diva-s* 'divas' [vs. real Italian *Div-e*], *Havanna-s* 'Havanna(-cigars)s', *Pascha-s* 'pashas', *Señorita-s* 'señoritas', *Sofa-s* 'sofas', *Zebra-s* 'zebras'; *Cello-s* 'cellos' [vs. real Italian *Cell-i*], *Echo-s* 'echoes', *Gaucho-s* 'gauchos', *Mikado-s* 'emperors of Japan; (games of) pick-up sticks', *Motto-s* 'mottos', *Veto-s* 'vetos'; *Känguruh-s* 'kangaroos', *Kudu-s* 'kudus'.

(II) On the other hand, it seems that the NHG *-s* plural has been generalized from the above (at least partially) phonological environments to the (near-entirety of the) various morphological subclasses overlappingly involved there, so that plural *-s* is now also frequently found with monosyllables (including vowel-final ones) and sometimes even after polysyllables which end in schwa. (A) This distribution is most striking in those cases where it affects native NHG vocabulary.

(1) The use of *-s* with full (unshortened) words of this sort can be illustrated for several of the subclasses introduced above. (a) Even in formal adult-speech, fore example, some NHG-speakers use *-s* plurals for nouns like *Album-s+* 'albums' and *Kuckuck-s+* 'cuckoos'. (b) Similarly, in caretakers' speech to young children, the name of a relative can be pluralized by using *-s* in order to refer both to that relative and to his/her family or house--cf., e.g., *Onkel-s* 'uncles (i.e., one's uncle's family)'. (c) Finally, in NHG adult-slang--and in colloquial speech more generally--surprisingly extensive use of plural *-s* is made in instances like *Bräutigam-s* 'bridegrooms', *Fräulein-s* 'misses, ladies', *Jung-s* 'boys, guys', *Kerl-s* 'lads, guys', *Mädel-s* 'girls, gals'. (2) But *-s* plurals can likewise be seen and heard in NHG shortened forms which end in a consonant. (a) Regarding acronyms of this type, there has survived from World War II, for example, the military term *Flak-s+* 'flaks, anti-aircraft gun(-firing)s' (< ***Fl**ug(zeug)**a**bwehr**k**anone(-n)*) 'air(plane)-defense cannon(s)'); a much more recent clipped form is *Treff-s* 'meetings' (< ***Treff**en(-Ø)*). (b) A number of letter-by-letter abbreviations (LBLAs) like *KZ-s* 'concentration-camps' (< ***K**on**z**entrationslager(-Ø)*), however, also date from the unfortunate events of World War II.

(3) In addition to full and shortened forms, though, it is convenient to establish a third category for those numerous cases where the NHG plural-suffix *-s* is attached to names and nominalizations of various sorts. (a) This is shown by plural names of people (persons), for example. (i) Thus, both first names and last names (the latter when they stand for individuals) normally are pluralized with *-s*, as in *Rudolf-s+* and *Goethe-s*. (ii) But, in NHG, people's last names also make use of *-s* as an indicator of plurality when they refer to groups, as do the following: *Barring-s*, *Baumann-s*, *Buddenbrook-s*, *Grimm-s+*, *Handke-s*, *Meyer-s*, *Müller-s*. (iii) Finally, the *-s* plural is suffixed to titles and occupations which are used with the effect of family-names (in colloquial speech): cf., e.g., *Apotheker-s+*'druggists (i.e., the druggist's family)', *Bürgermeister-s+* 'mayors (i.e., the mayor's family)', *Medizinalrat-s+* 'medical(-health) officers (i.e., the medical health-officer's family)', *Pastor-s+* 'ministers (i.e., the minister's family)', *Professor-s+* 'professors (i.e., the professor's family)'. (b) But this still leaves place-names to be treated. (i) In the case of NHG names for countries, for instance, the fact that *-s* is their dominant plural-marker is shown by examples like *Deutschland-s+* 'Germanies' and *Jemen-s* 'Yemens'. (ii) For names of cities and towns, however, *-s* is also employed as the usual way to pluralize them: examples of this phenomenon include *Berlin-s*, *Düsseldorf-s*, and *Kirchheim-s*. (c) Nevertheless, still within the category of naming, a further, non-geographical use of *-s* plurals in NHG has to do with names for colors; here, we find at least *Blau-s+* 'blue(-color)s', *Grau-s+* 'gray(-color)s'; *Braun-s+* 'browns', *Gelb-s+* 'yellows', *Grün-s+* 'green(-color)s', *Rot-s+*'red(-color)s'. (d) At least indirectly related to that usage is *-s* pluralization of (names of) linguistic entities. (i) Plurals for letters of the NHG alphabet, for instance, are formed with the suffix *-s*; cf., e.g., *A-s* 'As', *B-s* 'Bs', *Z-s* 'Zs'. (ii) This same *-s* ending is used to pluralize (names of) interjections like *Ach-s* 'oh(, dear)s', *Ah-s* 'ahs', *Buh-s* 'boos', *O(h)-s* 'o(h)s', *Pfui-s* 'ughs, yucks'. (iii) And matters are no different in NHG for words used metalinguistically (especially conjunctions), such as *Aber-s+* 'buts', *Entweder-s+* 'eithers', *Ich-s+* 'Is, selves, egos', *Oder-s* 'ors', *Warum-s* 'whys *Wenn-s+* 'ifs'. (e) Finally, two kinds of nominalizations employ *-s* as their preferred plural-suffix. (i) First, there are certain nominalized adjectives like *Eingesandt-s* 'send-ins, letters to the editor (sent in by readers)', *Hoch-s* '(meteorological) highs', and *Tief-s* '(meteorological) lows'. (ii) Second, there are also such nominalized phrases in NHG as *Drei-käse-hoch-s+* 'tiny tots' (< 'three cheeses high'), *Guten-tag-s* 'greetings, "good-day"s', *Lebe-hoch-s* '(three) cheers, vivas' (< '(long) live "high" ...!'), *Le-be-wohl-s+* 'fare-wells', *Schlage-tot-s* 'cutthroats' (< 'strike-dead'), *Schubbe-jack-s* 'flea-bitten beg-

gars' (< 'scratch-jacket'), *Stell-dich-ein-s+* 'rendez(-)vous', *Vergiß-mein-nicht-s+* 'forget-me-nots'.

(B) In recent times, however, the largest group of NHG forms which take an *-s* plural has been found predominantly among loanwords--whereby not all foreign languages have contributed the same number of these. (a) The following representative borrowings come from Low German: *Deck-s+* 'decks', *Haff-s+* 'bays', *Knick-s+* 'hedges', *Wrack-s+* 'wrecks'. (b) At present, though, the most massive donor to NHG is English; cf., e.g., the following items (which are glossed only when they differ significantly from English): *Approach-(e)s*; *Back-s* 'defensive backs', *Babydoll-s* 'women's babydoll-pajamas', *Band-s* '(musical) bands', *Bar-s* 'drinking-establishments', *Bill-s* 'legislative bills', *Blank-s* 'blank( space)s', *Block-s+* 'factions; blocks (of paper or dwellings)', *Blow-up-s* 'photographic enalargements', *Bond-s*, *Boykott-s+*; *Champion-s*; *Crew-s* 'crews' (in sailors' speech), *Date-s*, *Drink-s*; *Eye-word-s* 'sight-words', *Feature-s* '(journalistic) features'; *Girl-s*; *Hole-s* '(golf-)holes'; *Infight-s* 'instances of close boxing'; *Jean*(-)*s* 'jean(-)s', *Jeep-s*, *Juice-s* 'fruit-juices'; *Kode-s* 'codes'; *Look-s* 'styles of appearance', *Lumberjack-s* 'men's lumberjack-shirts', *Lunch-(e)s*; *Make-up-s* 'cosmetics', *Musical-s*; *Nugget-s*; *Office-s*; *Paper-s* 'documents, short written works', *Park-s*, *Pie-s* 'pies', *Pier-s*, *Ponytail-s*, *Plaid-s* 'plaid shawls or lap-rugs', *Pull-s* 'golf-strokes with spin to the left'; *Quark-s*; *Roastbeef-s*; *Scheck-s*, *Schock-s+*, *Shop-s*, *Show-s* 'shows', *Slip-s* '(underclothing-)slips', *Sloop-s*, *Smoking-s* '(smoking- >) dinner-jackets, tuxedos', *Snack-s*, *Snob-s*, *Star-s*, *Start-s*, *Steak-s*, *Story-s* '(short) stories', *Streik-s* '(work-) strikes', *Strip-s* 'stripteases'; *Team-s*, *Teen-s*, *Test-s+*, *Ticket-s*, *Tip-s* , *Track-s* 'racetracks, seaways', *Training-s*, *Tram(way)-s* 'tramways, streetcars', *Trend-s*, *Trust-s*, *Tunnel-s*; *Underdog-s*; *Vamp-s*; *Weekend-s*; *Zoom-s* 'zoom(-lense)s'; (b') only Pseudo-English, on the other hand, are *Happyend-s* 'happy endings' and *Twen-s* '"twenty..."-agers (21-to-29-year-olds)'. But NHG has (c) also borrowed quite extensively from French; cf. such representative loanwords as *Chef-s* 'bosses; chefs', *Ensémble-s* 'ensembles, groups', *Frack-s+* 'tail-coats', *Jeu-s* '(card-)games', *Kógnak-s* 'cognacs', *Korp*(-)*s* 'corps', *Leutnant-s* 'lieutenants' (heavily nativized), *Pli-s* 'smarts, wits', *Tick-s* 'tics, fixations'. Now that Low German, English, and French have been discussed , however, the remaining language-sources for NHG borrowing can all simply be presented together: viz., (d-e) Portuguese/Spanish *Senhor-es/Señor-es* 'Portuguese/Spanish gentlemen'; (f) Polish *Zloty-s* 'zlotys', (g) Russian *Wychuchol-s* 'Russian silvertip-mice' [vs. real Russian *vyxuxol-y*], (h) Hindi *Shampoon-s* 'shampoos', *Sikh-s* 'Sikhs', (i) Romany*Kaff-s* 'hick towns, burgs', (j) Ancient Greek *Bar-s* 'meteorological units, bars', (k) Latin (here including phrases) *Leg-es* '(parliamentary) bills', *Faktotum-s* 'factotums', *Vademekum-s* 'guides, handbooks', (l) Hungarian *Gulasch-s+* 'goulashes', (m) Arabic *Fellah-s* 'Arab farmers', (n) Khoisan *Gnu-s* 'gnus'.

## 5. Conclusions.

All of these various pieces of so-called "internal" and "external" evidence concerning diversity of environments for occurrence thus point clearly in the direction of *-s* being the productive plural-suffix for nouns in contemporary NHG--despite the fact that vanishingly few words in the language which take the *-s* plural are high-frequency items. We must therefore evaluate the criterion of environmental diversity (supplemented with other factors like productivity and double marking) as being a better indicator of formal morphological (un)markedness than is frequency. We may also note that, at least as it has emerged here for NHG, the factor of diverse contexts of occurrence has the benefit of bringing in evidence that is, in a sense, both language-internal (e.g., based on the facts of phonological conditioning in standard speech-varieties) and language-external (e.g., based on morpholexical facts from non-standard varieties and on borrowing).

Of quite some relevance to the case of NHG *-s* is the fact that the same reduction of many plural-markers to dominant *-s* occurred, earlier, in English. Thus, in Old English [OE], the set of common plural-suffixes included at least all of the following; (i) -Ø, (ii) ¨-Ø, (iii)-*(a)n*, (iv) *-as*, (v) *-ru*, (vi) *-a*, (vii) *-e*, (viii) *-o*, (ix) *-u*. This plethora of forms eventually shrank to where *-(e)s* became the only productive plural-suffix. Nevertheless, as most of the rival suffixes lost part of their domain, there was some spread of -(*e*)*n* within this shrinkage: cf., e.g., pairs like OE *word*-***Ø*** vs. ME *word*-***en*** 'words', OE *cȳ*-***Ø*** vs. ME *kī*-***ne*** 'cows', OE *dæd*-***e*** vs. ME *dēd*-***en*** 'deeds', OE *cild*-***ru*** vs. ME *child*-***r(-)en*** 'children', OE *sun*-***a*** vs. ME *sun*-***en*** 'sons', OE *lim*-***u*** vs. ME *lim*-***en*** 'limbs', and OE *scō*-***s*** vs. ME *shoo*-***n*** 'shoes'. The suggestive overall implication from the past history of English for the future history of NHG is that, in the latter language, the main competitor with *-s* for status as the dominant plural-marker will be *-(e)n*, which may even predominate numerically over *-s* for some time. This suggestion is reinforced by the the past and present history of Dutch (cf. van Loey 1970:254, 265-269 and Donaldson 1981$^1$/1987$^3$:33-39), of Yiddish (cf. King 1980), and of Low German (cf. Krogmann 1970b:224, 243 and Härd 1973:419), although the case of Frisian remains somewhat problematic (cf. Krogmann 1970a:193, 203, 207, 208). Nevertheless, given all this West Germanic evidence, it is in fact possible to extrapolate from the present findings from NHG to the general principle given immediately below.

If a language has all three of the following: (a) primarily initial stress (for native words), (b) several plural-markers (including -Ø, ablaut, schwa, at least one suffix consisting of schwa plus a sonorant consonant, and combinations of these), and (c) extensive borrowing from two or more influential neighboring languages whose dominant plural-marker is *-s* (phonologically and/or possibly also only orthographically)--then *-s* will eventually become that language's unmarked, regular plural-marker, probably after a period of intense competition with a marker consisting of schwa plus a sonorant consonant (especially a nasal).

This kind of change is governed crucially by three factors. First, /s/ seems to be virtually unique in its phonological property of being able to combine felicitously with both following vowels and following consonants without creating either hiatus or excessively complex consonant-clusters. Second, /s/ possesses a special diachronic "durability" relative to other suffixes: whereas /n/ can be lost outright and /e/ (or other vowels) can undergo reduction to schwa and then to Ø, initial-stressed languages apparently tend not to lose /s/ via aspiration and then loss (as in penultimate-stressed Andalusian and Caribbean Spanish) but at most via the rather long chain of changes /s/ > /z/ > /r/ > Ø). Third and finally, both because /s/ is so phonologically well-suited to follow forms which may be resistant to combination with other suffixes and because it is so diachronically persistent, /s/ is especially likely to undergo a reinterpretational transition where it originates (either natively or via borrowing) as a kind of lexically listed element (or as the result of an early-level lexical rule for idiosyncratic items) having a rather marginal morphological status but later comes to rest in a grammatical locus as the final, catch-all rule (general default) ordered after a set of more specific rules for competing markers.[10]

Only further research will be able to confirm or disconfirm the prediction made above concerning the probable future spread of /s/-suffixes in all languages of Germanic type. But, for the present, the eventual emergence of *-s* as the dominant plural-ending of NHG seems extremely likely--at the very least, if judged on the basis of the comparative West Germanic evidence. But spelling out the details of that wider perspective must be the subject of another paper.

## NOTES

* The treatment of Modern/"New" High German (NHG) *-s* presented here originated in my dissertation (Janda 1987) as a very brief point (pp. 498-501) ancillary to a discussion of the more central claim there that, in NHG forms like *Grund/Gründe* 'reason'/'reasons', the *-e* suffix does not represent the language's unmarked plural-marker. A revised and expanded version was then given in February, 1990 at the 14th Annual Penn Linguistics Colloquium in Philadelphia; for the helpful comments which they made at that time, I am grateful to G. Cardona, W. Labov, C. Richardson, D. Ringe, and G. Sankoff. For additional discussion of the further revised presentation given at ESCOL '90 in Columbus during September, 1990, I would also like to thank J. Fontana, H. Hiz, N. Jacobs, A. Kroch, D. R. Ladd, D. Perlmutter, E. Prince, H. Sachs, T. Veatch, and K. Zubritskaya, among others. For various other sorts of help and encouragement, I am indebted to P. and Ro. Janda, D. and J. Ellis, C. Silva-Corvalán and M. Saltarelli, and especially several people at the UCLA Phonetics-Lab (M. Godínez, I. Maddieson, P. Ladefoged, and A. Shryock). Most of

all, though, I would like to thank the more than patient J. Auger, B. Joseph, and Y.-K. No.

**1.** However, there is in NHG no clear case of umlaut with the plural-suffix -(*e*)*n*. While the idiomatic phrasal preposition ***zu Häupt-en*** (*von* ...) 'at the head (of ...), at ...'s head' is etymologically descended from the Old High German dat[ive] pl[ural] *zi houbit-um* ... (cf. *houbit* 'head'; see Kluge/Mitzka $1883^1/1960^{18}$:293), archaic NHG *Haupt* 'head' now has an umlauted plural with the suffix ***-er*** (i.e., ***Häupt-er***, dat. ***Häupt-er-n***--where *-n* marks dat. pl.). Thus, the contemporary analysis of (*zu*) ***Häupt-en*** is probably as an idiosyncratic dat. s[ingular] form, especially in view of: (i) its sg. semantics (cf. English *at John's head/*heads*), (ii) the number-ambiguity in the paired antonymous form ***zu Füß-e(-)n*** (von) 'at the foot/feet (of ...)', which may similarly be interpreted as sg. (i.e., as coming from *Fuß* 'foot' plus dat. sg. *-en*, rather than from ***Füß-e*** 'feet' plus dat. pl. *-n*), and (iii) the parallelism of the archaic fem[inine] dat. sg. *-n* in the fixed expression ***auf Erde-n*** 'on earth' (vs. modern fem. dat. sg. -Ø in *von der Erde-Ø* 'of the earth', etc.). And of course such umlauted dat. pl. nouns as *Gründ-e-n* 'reasons' do not involve the single suffix *-en*, but instead the sequence of suffixes *-e-n* (where *-e*(-) is one of the general pl.-suffixes here at issue and *-n* marks dat. pl.--as seen above and also alone in, e.g., ***Maler-n***, the dat. form of Ø-plural ***Maler-Ø*** 'painters').

**2.** In Yiddish, on the other hand, while *-im* is clearly not the (most) unmarked indicator of nominal plurality, it is nevertheless "one of the six major modes of noun-plural formation" in the language (cf. King 1980:47, 51), having been extended from masculine- and neuter-gender borrowings of Hebrew/Aramaic origin (like ***nes-im*** 'miracles') to inherited Germanic vocabulary (like ***pojer-im*** 'peasants', ***tajvol-im*** 'devils', and ***betlojr-im*** 'beggars') and even to (other) loanwords of Slavic and Latinate provenance (like ***polak-im*** 'Poles' and ***doktojr-im*** 'doctors'). The factor responsible for this great difference in status between *-im* in Yiddish and *-im* in English is obviously that only Yiddish has borrowed heavily from Hebrew. However, as will later be hinted at indirectly (in Section 5 of the main text), the borrowing and extension by Yiddish of another plural-ending from Hebrew/Aramaic has accidentally led to a major convergence with the English system of nominal number-marking.

**3.** It must be admitted that the analysis of seemingly double-marked past-tense verb-forms like English dialectal ***stole-d*** is not uncontroversial. M. Halle (personal communication), for example, would apparently argue that, in such instances, the ablaut of, e.g., *stole* "has been reanalyzed as part of ... [a] stem" which is presumably listed in the lexicon (rather than derived by rule). However, since this specific stem must both be characterized as [+past] (or with some other feature(s) which will prevent its occurrence in the present tense) and yet also receive the suffix -(*e*)*d* via the general English rule which spells out [+past], it is not clear how Halle's approach can avoid violating the "Elsewhere"-Condition. S. Anderson, on the other hand, would--given his 1986 treatment of the parallel case of NHG "mixed" verbs--presumably analyze a form like ***stole-d*** as derived via regular past-tense -(*e*)*d* suffixation to an unmarked (basic) stem *stole*--which happens to occur only in the past because *steal* is a marked, "suppletive" stem lexically listed as [+present]. Unfortunately, there exists no independent evidence that *stole* is basic or that *steal* is non-basic. If anything, the available evidence goes the other way: e.g., the Ø-derived noun from this verb is *steal*, not **stole* (*stole* 'scarf(-like garment)' was borrowed from Latin into Old English at a time when the *steal*'s etymon *stelan* had the sg./pl. past(s) *stæl/stǣlon*). Furthermore, the overwhelming evidence from analogical leveling in English is that present-tense forms are generalized at the expense of past-tense ones, rather than vice versa. Finally, Anderson's 1982: 607-609 own earlier analysis for the past subjunctive of NHG "mixed" verbs requires that their present-stem be treated as unmarked (basic) and their past-stem lexically listed as irregular, since the latter undergoes umlaut. Given such analytical contortions and contradictions as the price to pay for maintaining the "Elsewhere"-Condition in morphology, it is surprising how doggedly many analysts seem determined to defend that constraint at any cost (a point discussed in more detail by Janda 1991).

**4.** Because those few NHG words in the relevant sample which possess two plurals have been counted twice, the grand total of percentages in the overall calculation here slightly exceeds 100%.

**5.** If the umlaut-variants found for some of the NHG plural-suffixes are counted separately, the unmarkedness-ranking for the various indicators of the plural (again assigned according to points ranging from 10.00 down to 0.00) is roughly the following: -(*e*)*n* = 4.15, -*e* = 2.35, ¨-*e* = 1.15, -Ø = 1.00, ¨-*er* = 0.65, -*s* = 0.35, -*er* = 0.30, ¨-Ø = 0.30. Here, -*s* is ever so slightly less marked than -*er* and -Ø--but only if non-standard plurals in -*s* are counted; otherwise, -*s* = 0.10 and once more is ranked as most highly marked. Furthermore, because all plurals in -*er* occur with roots whose last unreduced vowel is an (invariant) unrounded front one (recall neut. ***Kind-er*** 'children' and masc. ***Geist-er*** 'spirits'), while all plurals in ¨-*er* have on the phonetic surface a root whose last unreduced vowel is a (derived) front one (recall neut. ***Dörf-er*** 'villages' and masc. ***Männ-er*** 'men'), there is really no good reason to separate these two types of -*er* plurals. Instead, one can just characterize all -*er* plurals as involving a front(ed)-vowel root (for which ¨-*er* is perhaps a more perspicuous abbreviation). This is not the case for plurals in -*e* vs. ¨-*e* or -Ø vs. ¨-Ø, however (cf., e.g., ***Bund-e*** 'bundles' vs. ***Bünd-e*** 'alliances' and, for many/most speakers, ***Wa-gen-Ø*** 'cars' vs. ***Mägen-Ø*** 'stomachs'), and so there is some justification for distinguishing these last four types.

**6.** As before, the fact that a few nouns in "basic" vocabulary possess two possible plurals which have both been counted in the present frequency-calculations is what causes the various percentages involved there to add up to slighly more than 100%.

**7.** If, as before, the umlaut-variants found for some of the NHG plural-suffixes are once more counted separately, then the unmarkedness-ranking for the various indicators of the plural (yet again assigned according to points ranging from 10.00 down to 0.00) is roughly the following: -(*e*)*n* = 2.80, -*e* = 2.20, ¨-*e* = 1.70, -Ø = 1.10, ¨-*er* = 0.80, ¨-Ø = 0.60, -*er* = 0.30, -*s* = 0.00. This hierarchy for NHG plural-suffix type-frequencies in "basic" vocabulary is quite similar to the token-frequency-based one given in 5 above (especially if -Ø and ¨-Ø are (re)combined, as suggested there): here, too, most unmarked -(*e*)*n* and most marked -*s* are again at opposite ends of the scale.

**8.** The few exceptions which contradict this generalization are virtually all morphologically governed. Thus, the two nominal suffixes -*ie* (originally borrowed from French) and its later offshoot -*ei* are both normally pluralized via suffixation of -*(e)n* rather than of -*s*--cf., e.g., ***Melod-ie-n*** 'melodies' (vs. ***melod-isch*** 'melodic') and ***Abt-ei-en*** 'abbeys' (vs. *Abt* 'abbot').

**9.** Those NHG words in the main text which are marked with a cross (+) have at least one variant-plural with a suffix other than -*s*. Since the number of such forms there where a non-sibilant plural-suffix occurs (much) more commonly than does -*s* is roughly equal to the number of forms for which -*s* is (much) more common than other indicators of the plural, it has here been assumed that such disparities more or less cancel each other out and can thus be passed over without this seriously affecting the major conclusions of the present paper. It should also be mentioned that, as occasionally pointed out for certain items in the main text, some of the NHG noun-plurals listed there have a social distribution which is limited either regionally (e.g., Northern vs. Southern Germany, or Germany vs. Austria and Switzerland) or stylistically (e.g., formal vs. informal speech vs. slang).

**10.** I have kindly been informed by I. Rauch (personal communication) that she remembers T. Vennemann as previously having stated that -*s* is even now the unmarked plural-suffix of NHG and so as also having predicted its eventual future spread. Unfortunately, neither of us has yet been able to determine where (and whether) Vennemann's observations have appeared in print. For an anticipation of the present conclusion that -*s* is the NHG default-plural, see van Dam's 1940:172-173 characterization of -*s* as a "*Notpluralendung*": 'an "emergency" plural-ending ... [which] appears whenever another [suffix] is not possible." For the opposing prediction that, in the future, the NHG nominal plural-suffix -*s* "will largely be replaced by 'German' ways of [number-marker] formation", see Moser 1964:92-93.

## REFERENCES

Anderson, S. 1982. "Where's Morphology?". *Linguistic Inquiry* 13.4:571-612.

Anderson, S. 1986. "Disjunctive Ordering in Inflectional Morphology". *Natural Language &*

*Linguistic Theory* 4.1:1-31.

Battistella, E. 1990. *Markedness: The Evaluative Superstructure of Language.* Albany: State University of New York Press. (SUNY Series in Linguistics.)

Bynon, T. 1977. *Historical Linguistics.* Cambridge[, England]: Cambridge University Press. (Cambridge Textbooks in Linguistics.)

Carroll, J., P. Davies, and B. Richman. 1971. *The American Heritage Work Frequency Book.* Boston: Houghton Mifflin Company and New York: American Heritage Publishing Co., Inc.

Chomsky, N. and M. Halle. 1968. *The Sound Pattern of English.* New York: Harper & Row, Publishers, Incorporated. (Studies in Language.)

Croft, W. 1990. *Typology and Universals.* Cambridge[, England]: Cambridge University Press. (Cambridge Textbooks in Linguistics.)

Donaldson, B. $1981^1/1987^3$. *Dutch Reference Grammar.* Leiden: Martinus Nijhoff, 1981, 1987 (third edition).

Eckman, F., E. Moravcsik, and J. Wirth (eds.). 1986. *Markedness.* New York: Plenum Press.

Greenberg, J. 1966a/1966b. "Language Universals". In T. Sebeok (ed.), *Current Trends in Linguistics, Volume III: Theoretical Foundations.* The Hague: Mouton & Co., Publishers, 1966, pp. 61-112. Revised version published as *Language Universals: With Special Reference to Feature Hierarchies.* The Hague: Mouton & Co., Publishers, 1966. (Janua Linguarum, Series Minor, 59.)

Härd, J. 1973. "Mittelniederdeutsch". In H. Althaus et al. (eds.), *Lexikon der Germanistischen Linguistik. Studienausgabe II.* Tübingen: Max Niemeyer Verlag, pp. 418-421.

Hjelmslev, L. 1935-1937. *La catégorie des cas. Acta Jutlandica* 7.1 (1935), 9.2 (1937). [Copenhagen: Universitetsforlaget i Aarhus.]

Hjelmslev, L. 1943/1953. *Omkring Sprogteoriens Grundlæggelse.* Copenhagen: Ejnar Munksgaard, 1943. English translation by F. Whitfield, *Prolegomena to a Theory of Language.* Madison: University of Wisconsin Press, 1953.

Jakobson, R. 1932/1984. "Zur Struktur des russischen Verbums". In *Charisteria Guilelmo Mathesio quinquagenario a discipulis et Circuli Linguistici Pragensis sodalibus oblata.* Prague: 1932, pp. 74-84. Translated into English as "Structure of the Russian Verb". In Jakobson 1984, pp. 1-14.

Jakobson, R. 1939/1984. "Signe zéro". In *Mélanges de linguistique offerts à Charles Bally.* Geneva: 1939. Translated into English as "Zero Sign". In Jakobson 1984, pp. 151-160.

Jakobson, R. 1941/1968. *Kindersprache, Aphasie und allgemeine Lautgesetze.* Uppsala: Almqvist & Wiksell. (Uppsala Universitets Aarskrift, 1941). Translated into English by A. Keiler as *Child Language, Aphasia and Phonological Universals.* The Hague: Mouton & Co., Publishers, 1968.

Jakobson, R. [L. Waugh and M. Halle (eds.).] 1984. *Russian and Slavic Grammar: Studies 1931-1981.* The Hague: Mouton Publishers. (Janua Linguarum, Series Maior, 106.)

Janda, R. 1984. "Why Morphological Metathesis Rules Are Rare: On the Possibility of Historical Explanation in Linguistics". In C. Brugman and M. Macaulay (eds.), *Proceedings of the Tenth Annual Meeting of the Berkeley Linguistics Society; February 17-20, 1984.* Berkeley, California: Berkeley Linguistics Society; University of California, Berkeley, pp. 87-103.

Janda, R. 1987. *On the Motivation for an Evolutionary Typology of Sound-Structural Rules.* Ph.D.-dissertation, UCLA.

Janda, R. 1991. "St. Elsewhere, the Teflon Precedent?: On the Validity of the Counterevidence to the 'Elsewhere' Condition". Paper presented at the 15th Annual Penn Linguistics Colloquium; Philadelphia, Pennsylvania; February 16-17, 1991.

King, R. 1980. "On the Origins of the *S*-Plural in Yiddish". In P. Wexler (ed.), *Studies in Yiddish Linguistics.* Tübingen: Max Niemeyer Verlag, pp. 47-53.

Kluge, F./W. Mitzka (ed. of 18th edition). $1883^1/1960^{18}$. *Etymologisches Wörterbuch der deutschen Sprache.* Strassburg: Karl J. Trübner, 1883 (1. Auflage). Edited by W. Mitzka and published in [West ]Berlin: Walter de Gruyter & Co., 1960 (18. Auflage).

Krogmann, W. 1970. "Altfriesisch". In Schmitt (ed.), pp. 190-210.

Krogmann, W. 1970. "Altsächsisch und Mittelniederdeutsch". In Schmitt (ed.), pp. 211-252.

Lightfoot, D. 1979. *Principles of Diachronic Syntax*. Cambridge[, England]: Cambridge University Press. (Cambridge Studies in Linguistics, 23.)

Mauriac, F. 1928. *Le chair et le sang*. Paris: Éditions Flammarion.

Moser, H. 1964. "Zum Formenausgleich in der heutigen deutschen Hochsprache. In W. Betz, E. Coleman, [and] K. Northcott (eds.), *Taylor Starck Festschrift 1964*. .The Hague: Mouton & Co., Publishers, pp. 91-101.

Nielsen, H. 1979/1989. *De germanske sprog: baggrund og gruppering*. Odense: Odense University Press, 1979. Extensively revised and translated by the author as *The Germanic Languages: Origins and Early Dialectal Interrelations*. Tuscaloosa: University of Alabama Press, 1989.

Ohala, J. 1974. "Phonetic Explanation in Phonology". In A. Bruck et al. (eds.), *Papers from the Parasession on Natural Phonology; April 18, 1974*. Chicago: Chicago Linguistic Society, pp. 251-274.

Ohala, J. 1981. "The Listener as a Source of Sound Change". In C. Masek et al. (eds.), *Papers from the Parasession on Language and Behavior, Chicago Linguistic Society; May 1-2, 1981*. Chicago: Chicago Linguistic Society, pp. 178-203.

Ohala, J. 1983. "The Origin of Sound Patterns in Vocal Tract Constraints". In P. MacNeilage (ed.), *The Production of Speech*. New York: Springer-Verlag New York Inc., pp. 183-216.

Ohala, J. and J. Jaeger (eds.). 1986. *Experimental Phonology*. Orlando: Academic Press, Inc. (Harcourt Brace Jovanovich, Publishers).

Paul, H. 1880$^1$/1920$^5$/1970$^8$. *Prinzipien der Sprachgeschichte*. Tübingen: Max Niemeyer Verlag, 1970 (Studienausgabe der 8. Auflage). (Konzepte der Sprach- und Literaturwissenschaft, 6.)

Pfeffer, J. 1964. *Grunddeutsch: Basic (Spoken) German Word List: Grundstufe*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. (with the U.S. Office of Education). (Publications of the Institute for Basic German, University of Pittsburgh, 1.)

Pfeffer, J. 1975. *Grunddeutsch: Erarbeitung und Wertung dreier deutscher Korpora. Ein Bericht aus dem "Institute for Basic German"--Pittsburgh*. Tübingen: TBV Verlag Gunter Narr. (Forschungsberichte des Instituts für deutsche Sprache, Mannheim, 27.)

Plank, F. 1981. *Morphologische (Ir-)Regularitäten: Aspekte der Wortstrukturtheorie*. Tübingen: Gunter Narr Verlag. (Studien zur deutschen Grammatik, 13.)

Ringe, D., Jr. 1990-MS. "On Calculating the Factor of Chance in Language Comparison". Unpublished paper, University of Pennsylvania.

Schmitt, L. (ed.). 1970. *Kurzer Grundriß der germanischen Philologie bis 1500. Band 1: Sprachgeschichte*. [West ]Berlin: Walter de Gruyter & Co.

Szymanek, B. 1989. *Introduction to Morphological Analysis*. Warsaw: Państwowe Wydawnictwo Naukowe.

Trubetzkoy, N. 1931. "Die phonologischen Systeme". *Travaux du Cercle Linguistique de Prague* 4:96-116.

Trubetzkoy, N. 1939$^1$/1949$^2$/1969. *Grundzüge der Phonologie. Travaux du Cercle Linguistique de Prague* 7 (1939). Published with additions in Göttingen: Vandenhoek & Ruprecht, 1949 (2. Auflage). Translated into English by C. Baltaxe as *Principles of Phonology*. Berkeley: University of California Press, 1969.

van Dam, J. 1940. *Handbuch der deutschen Sprache. Zweiter Band: Wortlehre*. Groningen: J. B. Wolters' Uitgevers-Maatschappij N. V.

van Loey, A. 1970. "Altniederländisch und Mittelniederländisch". In Schmitt (ed.), pp. 253-287.

Wakelin, M. 1984. "Rural Dialects in England". In P. Trudgill (ed.), *Language in the British Isles*. Cambridge[, England]: Cambridge University Press, pp. 70-93.

ESCOL '90 154-165

# DISCOURSE-LINKING AND THE *WH*-ISLAND EXTRACTION ASYMMETRY*

Tina E. Kraskow
University of Pennsylvania

Since the initial observation of the unacceptability of extracting out of an indirect question (Chomsky 1964), shown in (1),

(1) *What did he wonder where John put?

and the proposal that the island constraints (the so-called *Wh*-Island Constraint together with Ross' 1967 island constraints) could receive a unified explanation in terms of Subjacency (Chomsky 1973, 1977), there have been numerous reports in the literature of languages which allow *wh*-island extraction, but only for certain kinds of *wh*-phrases and not for others. These languages constitute a diverse group, and include, among others, Italian (Rizzi 1978), the Scandinavian languages (Maling 1978; Engdahl 1979, 1980; Maling and Zaenen 1982), Bulgarian (Rudin 1982, Bedzyk 1987, Kraskow 1987), Romanian (Comorovski 1985, 1986), and Japanese (Nishigauchi 1986). The asymmetric pattern of *wh*-island extraction exhibited by these languages was initially considered by some linguists to be an interrogative vs. relative asymmetry, however, further investigation showed that the asymmetry was not between interrogatives and relatives, but rather between certain kinds of interrogatives, on the one hand, and other kinds of interrogatives and relative pronouns, on the other. The pattern of *wh*-island extraction that emerged is illustrated below, with examples from Italian (Rizzi 1982:fn.5 (ia), (ib); (6b) modified).

(2) ??A chi non ti ricordi quanti soldi hai dato? [Italian]
'To whom don't you remember how much money you gave?'
(3) A quale dei tuoi figli non ti ricordi quanti soldi hai dato?
'To which one of your sons don't you remember how much money you gave?'
(4) Tuo figlio, a cui non ti ricordi quanti soldi hai dato,...
'Your son, to whom you don't remember how much money you gave...'

The extraction in (2), in which the prepositional object is an interrogative pronoun, is ungrammatical, but the extraction of the *which*-phrase in (3) and the relative pronoun in (4) is grammatical. The contrast between examples of type (2) and (3) was attributed to the 'heaviness' (Rizzi 1978, Rudin 1988) or the 'relative weight' (Engdahl 1979, Maling and Zaenen 1982) of the extracted *wh*-phrase, among other factors, however, other work (Comorovski 1985, 1988; Nishigauchi 1986; Bedzyk 1987; Cinque 1989) characterized the contrast between these two types of examples in terms of the notion of Discourse-linking (D-linking) (Pesetsky 1984). D-linked *wh*-phrases, according to Pesetsky, are *wh*-phrases which refer to members of a set established in the discourse, for example, *which*-NPs, in contrast to non-D-linked *wh*-phrases, which do not, for example, the normal use of the interrogative pronouns *who* or *what*. Under this view, which we will adopt here, the paradigm above shows the ungrammaticality of non-D-linked extraction ((2)), and the grammaticality of D-linked extraction ((3) and (4)). The other languages of this group pattern like Italian.[1]

(5) *Vad visste ingen vem som skrev?[2] [Swedish]
'What did no one know who wrote?' (Maling 1978:(18d))
(6) Vilka böcker mindes alla studenter vilken författare som skrivit?
'Which books did all the students remember which authors had written?' (Engdahl 1980:IV/(90))
(7) Det är melodin, som ingen visste, vem som skrev.
'This is the song that no one knew who wrote.' (Maling 1978:(17d))

(8) *Kogo si se chudil, koj e vidjal? [Bulgarian]
'Whom were you wondering who saw?'
(9) Koja zhena si se chudil, koj e vidjal?
'Which woman were you wondering who saw?'
(10) Zhenata, kojato si se chudil, koj e vidjal,...
'The woman, whom you were wondering who saw,...'

(11) *Pe cine nu ştii cine a văzut? [Romanian]
'Whom don't you know who saw?'
(12) Pe care femeie$_i$ nu ştii cine a văzut-o$_i$?[3]
'Which woman don't you know who saw?'
(13) Femeea, pe care$_i$ nu ştii cine a văzut-o$_i$,...
'The woman, whom you don't know who saw,...'

In Japanese, a *wh*-in-situ language, the D-linked/non-D-linked asymmetry is the result of *wh*-movement at LF. The asymmetry, therefore, shows up as a constraint on possible interpretations.

(14) John-wa [ittai dono sensi-ga dono computer-o [Japanese]
John-Top. the-hell which professor-Nom. which computer-Acc.
o-moti ka] oboe-te-i-masu-ka?
have -Q remember is -Q (Nishigauchi 1986:II/(53))
a. 'Does John remember which professor the hell has which computer?'
b. #'For which x, x a professor, does John remember [which computer y, x the hell has y]?'
(15) Inoue-sensei to, Katoo-sensei to, Satoo-sensei no nakade,
Inoue-professor and Katoo-professor and Satoo-professor of among
John-wa [dono sensei-ga dono computer-o o-moti ka]
John-Top. which professor-Nom. which computer-Acc. have -Q
oboe-te-iru-no-desu-ka?
remember is that is -Q (Nishigauchi 1986:II/(51))
'Among Professors Inoue, Kato, and Sato, for which x, x a professor, does John remember [which computer y, x has y]?'

In (14), the expression *ittai* ('the hell') is used to force a non-D-linked reading, and the *wh*-phrase *dono sensei-ga* ('which professor') cannot be understood as having matrix scope out of the *wh*-island (indicated by the '#' on (14b)). In (15), on the other hand, *dono sensei-ga* does have a D-linked interpretation, and the matrix scope interpretation is available.

The extraction asymmetry illustrated in (2)-(15) above has been interpreted to derive from the interaction of two independent principles of the grammar, Subjacency and an independent constraint, yet to be determined, which is sensitive to the nature of the *wh*-phrase being moved. In order to derive the acceptable cases of D-linked extraction, Subjacency must predict *wh*-island extraction in these languages to be grammatical. Since Subjacency is not sensitive to the nature of the *wh*-phrase being moved, both D- and non-D-linked extraction will be predicted to be acceptable. The independent constraint will then rule out the non-D-linked cases. The extraction asymmetry, then, falls out of the fact that Subjacency predicts these languages to not obey the *Wh*-Island Constraint, and an independent constraint rules non-D-linked extraction out. This analysis raises the following questions:

(i) Assuming Subjacency, how do we predict these languages to not obey the *Wh*-Island Constraint?
(ii) What is the nature of the constraint distinguishing D-linked from non-D-linked extraction, ruling out only the cases of non-D-linked extraction?

In this paper I will focus primarily on the first question, although I will show that the answer is not unrelated to the second, in that it must make reference to D-linking. The paper is organized as follows. In section 1.1, I briefly discuss question (ii). In section 1.2, I turn to question (i), and discuss the problems the extraction facts in these languages pose for Subjacency. In section 1.3, I address certain problems raised by Romanian and Bulgarian, and, finally, in section 2, I propose a unified analysis of the *wh*-island extraction facts in these languages.

## 1. *Wh*-Island Extraction

### 1.1. The D-Linked/Non-D-Linked Asymmetry

In this section I briefly review two theories which have been proposed in answer to question (ii), that of Comorovski (1988, 1989), and that of Cinque (1989). Comorovski proposes that the explanation for the D-linked/non-D-linked asymmetry is semantic and pragmatic in nature, related to the presuppositions of *wh*-island extractions. She proposes a felicity condition on questions which requires that the hearer be able to check the truth of the presuppositions of the question, and which must be satisfied in order for the question to be answerable. The extraction asymmetry falls out of the fact that D-linked extraction satisfies this condition, but non-D-linked extraction does not, the hearer being unable to check the truth of the presuppositions of the question.

Cinque proposes that the explanation for the D-linked/non-D-linked asymmetry is syntactic in nature (but see Kroch 1990).[4] Cinque refines Rizzi's (1988) proposal, under which the argument/adjunct asymmetries standardly treated under the Empty Category Principle (ECP) were recast as referential/nonreferential asymmetries. Referential *wh*-phrases, receiving a referential index, were constrained by binding, whereas nonreferential *wh*-phrases, being unindexed, were constrained by antecedent-government. In the case of *wh*-island extraction, a referential *wh*-phrase was able to bind its trace over the *wh*-island, but a nonreferential *wh*-phrase was not able to antecedent-govern its trace, the *wh*-island creating a barrier to antecedent-government. Cinque proposed that the notion of referentiality be restricted to *wh*-phrases which were used referentially, that is, which were D-linked. The asymmetry, then, falls out as above, the D-linked *wh*-phrase binding its trace over the *wh*-island, but the non-D-linked *wh*-phrase failing to antecedent-govern its trace.

Both these theories rely upon Subjacency to predict the acceptability of *wh*-island extraction for the cases of D-linked extraction. There are empirical and conceptual problems with the Subjacency account of *wh*-island extraction, however, and, because of the way they interact with Subjacency, this undermines the theories of Comorovski and Cinque above.

### 1.2. Subjacency and the *Wh*-Island Constraint

Subjacency accounts for the *Wh*-Island Constraint in the following way. Subjacency is defined as in (16).

(16) Subjacency Condition
No rule can relate X, Y in the structure
$\ldots X \ldots [_{\alpha} \ldots [_{\beta} \ldots Y \ldots ] \ldots ] \ldots X \ldots$,
where α, ß are bounding nodes (α, ß = S, NP in English).[5]
(Chomsky 1973, 1977)

Consider example (1), repeated here as (17), with the structure in (18).

(17) *What did he wonder where John put?[6]
(18) $[_{S'1}\ [_{COMP}\ \text{what}_i]\ [_{S1} \ldots [_{S'2}\ [_{COMP}\ \text{where}_j]\ [_{S2} \ldots t_i\ t_j]]]]$

The ungrammaticality of (17) falls out of the fact that *what* crosses two bounding nodes, S1 and S2, thus violating Subjacency. The lower COMP, filled by *where*, is not a possible landing site due to the prohibition against a doubly filled COMP (the Doubly Filled COMP Filter of Chomsky and Lasnik 1977).

Given the Subjacency Condition, then, how do we explain the fact that the languages we are looking at do not obey the *Wh*-Island Constraint? This question was addressed by a number of linguists, who, for certain of these languages, showed how it was possible to avoid the effects of Subjacency, so that, rather than disconfirming Subjacency, these languages constituted further support for it. Rizzi (1978) proposed that the particular pattern of *wh*-island extraction in Italian relatives could be explained if we allowed the set of bounding nodes to be a parameterized option of the grammar, and S', in Italian, and not S, was a bounding node.[7] Comorovski (1986) showed that, given the acceptability of long-distance multiple *wh*-fronting in Romanian, Subjacency correctly predicted Romanian to not obey the *Wh*-Island Constraint, since the multiple *wh*-landing sites provided escape hatches for *wh*-island extraction.

Bulgarian patterned like Romanian (Rudin 1988). Nishigauchi (1986) proposed for Japanese that Subjacency ruled out *wh*-movement from *wh*-islands at LF, assuming bounding nodes interrogative S′ and S (Chomsky 1981:305), and, following Pesetsky (1984), the extraction asymmetry fell out of the fact that only non-D-linked *wh*-phrases, being quantifiers, move at LF, whereas D-linked *wh*-phrases, not being quantifiers, take scope via coindexation without movement.

The Scandinavian languages, however, were not amenable to an analysis in terms of Subjacency (analyses within the phrase structure grammar framework were proposed by Engdahl 1980, 1986 and Maling and Zaenen 1982).[8] The Scandinavian languaguages, thus, constitute an empirical problem for Subjacency. The conceptual problem for Subjacency arises from the fact that we are forced to resort to three separate language-specific mechanisms in order to explain the uniform failure of these languages to obey the *Wh*-Island Constraint. In what follows, I will argue (a), that the multiple *wh*-movement analysis of *wh*-island extraction in Romanian and Bulgarian given above cannot be maintained in the *Barriers* framework, so that these languages constitute an additional empirical problem for Subjacency, and (b), that the empirical and conceptual problems outlined above can receive a unified analysis which, at the same time, accounts for the correlation between these facts and an independent set of *wh*-movement facts in these languages.

### 1.3. Multiple *Wh*-Movement and *Wh*-Island Extraction in *Barriers*

Comorovski (1986) showed for Romanian that, given the acceptability of long-distance multiple *wh*-fronting, Subjacency correctly predicted Romanian to not obey the *Wh*-Island Constraint. See example (19) for Romanian, with the structure in (20).

(19) Cine$_i$ cui$_j$ ce$_k$ ziceai că t$_i$ i$_j$-a promis t$_k$ t$_j$?
who to-whom what you-said that to-him-has promised
'Who did you say promised what to whom?' (Comorovski 1986:(1))
(20) $[_{S'}\ [_{COMP}\ wh_i\ wh_j\ wh_k]\ [_{S} \ldots [_{S'}\ [_{COMP}\ t_i'\ t_j'\ t_k'\ \text{that}]\ [_{S}\ t_i \ldots t_k\ t_j]]]]$

The acceptability of (19) shows that the multiply fronted *wh*-phrases move through COMP, since, assuming S to be a bounding node, direct movement to the matrix COMP would cross two bounding nodes, thereby, violating Subjacency.

Now consider the structure for *wh*-island extraction in (21).

(21) $[_{S'}\ [_{COMP}\ wh_i]\ [_{S} \ldots [_{S'}\ [_{COMP}\ t_i'\ wh_j]\ [_{S} \ldots t_j \ldots t_i \ldots]]]]$

The fact that COMP can be multiply filled means that the *wh*-phrase, *wh*$_i$, can move through the lower filled COMP, and, thus, extract out of the *wh*-island without crossing more than one bounding node. In this way, Subjacency predicts that a language which allows COMP to be multiply filled, and allows extraction from tensed clauses, will not obey the *Wh*-Island Constraint.

In the *Barriers* framework, however, this analysis is not available. This falls out as a side effect of the unification of the concept of locality in bounding and government theory in terms of the notion, 'barrier.' This fact is not directly apparent, as the Subjacency account, taken in isolation, yields the same facts as above.

The definitions for Subjacency and barrier are given below.[9]

(22) If $(\alpha,\alpha_{i+1})$ is a link of a chain, then $\alpha_{i+1}$ is subjacent to $\alpha_i$. ('subjacent' = 1-subjacent)
(23) $\beta$ is n-subjacent to $\alpha$ iff there are fewer than n+1 barriers for $\beta$ that exclude $\alpha$.
(24) $\gamma$ is a BC for $\beta$ iff $\gamma$ is not L-marked and $\gamma$ dominates $\beta$.
(25) $\gamma$ is a barrier for $\beta$ iff (a) or (b):
a. $\gamma$ immediately dominates $\delta$, $\delta$ a BC for $\beta$;
b. $\gamma$ is a BC for $\beta$, $\gamma \neq$ IP.

(26) and (27) below show the structures for *wh*-island extraction in a single and multiple *wh*-movement language, respectively.

(26) $[_{CP1}\ wh_i\ [_{IP1} \ldots [_{VP}\ t_i''[_{VP} \ldots [_{CP2}\ wh_j\ [_{IP2} \ldots t_j \ldots [_{VP}\ t_i'[_{VP} \ldots t_i \ldots]]]]]]]]$
(27) $[_{CP1}\ wh_i\ [_{IP1} \ldots [_{VP}\ t_i'''[_{VP} \ldots [_{CP2}\ [\ t_i''[\ wh_j]]\ [_{IP2} \ldots t_j \ldots [_{VP}\ t_i'[_{VP} \ldots t_i \ldots]]]]]]]]$[10]

Leaving aside adjunction to VP, in (26), the *wh*-phrase, $wh_i$, crosses two barriers, IP2, an inherent barrier, being the lowest tensed IP, and CP2, a barrier by inheritance, thus, violating Subjacency. In (27), no violation is incurred, since $wh_i$ moves through the filled [Spec, CP2], crossing only one barrier, IP2.

The problem for Subjacency arises from the consideration of another set of facts in Bulgarian and Romanian discussed in Rudin (1988). Rudin shows that the word order of the multiply fronted *wh*-phrases in Bulgarian and Romanian is fixed. See (28) and (29).

(28) a. Koj kakvo e vidjal? [Bulgarian]
who what has seen
'Who saw what?'
b. *Kakvo koj e vidjal?
'What did who see?'
(29) a. Cine ce a văzut? [Romanian]
who what has seen
b. *Ce cine a văzut?

Rudin proposed that the word order constraints were Superiority effects (Chomsky 1973), just as in multiple questions in English, shown in (30) below, but arising at S-structure, instead of LF.

(30) a. Who saw what?
b. *What did who see?

These effects have been subsumed under the ECP (Chomsky 1981).

(31) Empty Category Principle (ECP)
A nonpronominal empty category must be properly governed.
(32) α properly governs ß iff α θ-governs or antecedent-governs ß.
(Chomsky 1986:17)

Under the ECP analysis, the contrast between (30a) and (30b) falls out of the fact that at LF, the trace of the subject in (30a) is properly governed, but not in (30b). The LF structures are shown in (33).

(33) a. [$_{S'}$ [$_{COMP_i}$ what$_j$ [$_{COMP_i}$ who$_i$]] [$_S$ t$_i$ saw t$_j$]]
b. [$_{S'}$ [$_{COMP_i}$ who$_j$ [$_{COMP_i}$ what$_i$]] [$_S$ did t$_j$ see t$_i$]]

Assuming the COMP indexing algorithm of Aoun, Hornstein and Sportiche (1981), the subject trace in (33a) is antecedent-governed by the coindexed COMP$_i$, but not in (33b), since COMP$_i$ is not coindexed with it (see Lasnik and Saito 1984 for discussion). Now consider these structures in the *Barriers* framework.

(34) a. [$_{CP}$ [ what$_j$ [ who$_i$]]$_i$ [$_{IP}$ t$_j$ saw t$_i$]]
b. [$_{CP}$ [ who$_j$ [ what$_i$]]$_i$ [$_C$ did] [$_{IP}$ t$_j$ see t$_i$]]

To retain the ECP account of the Superiority effects, it must be the case that the *wh*-phrase in the adjoined to [Spec, CP] position does not antecedent-govern its trace. Under current definitions, this is a problem since the *wh*-phrase adjoined to [Spec, CP] governs its trace. As Chomsky (1986:49) notes, "We have not yet worked out the specific mechanisms of LF-movement of *wh*-in-situ, but it is clear...that the *wh*-phrase fronted at LF occupies a position in which it does not govern its trace." Consider this to be the case. Then, in order to preclude government, the *wh*-phrase adjoined to [Spec, CP] must be dominated by a barrier.

The consequences for Bulgarian and Romanian are clear. The structure for multiple questions at S-structure in Bulgarian and Romanian is the same as in English at LF, except that adjunction is to the right, reflecting the surface order (Rudin 1988). I use the English gloss in (35) and label the maximal projection dominating the *wh*-phrases in [Spec, CP], 'XP.'[11]

(35) [$_{CP}$ [$_{XP_i}$ [$_{XP_i}$ what$_i$] who$_j$] [$_{IP}$ t$_j$ has seen t$_i$]]

In (35), the *wh*-phrase adjoined to [Spec, CP], *who$_j$*, must be dominated by a barrier. The only possible candidate is the topmost segment of XP$_i$. Now consider the *wh*-island structure in (36).

(36) [$_{CP1}$ what$_i$ [$_{IP1}$ ...[$_{CP2}$ [$_{XP_j}$ [$_{XP_j}$ who$_j$] t$_i$'] [$_{IP2}$ t$_j$...t$_i$]]]]

If the topmost segment of XP$_j$ in [Spec, CP2] is a barrier, then extraction of *what$_i$* out of the adjoined to [Spec, CP2] position will induce a Subjacency violation, since it will cross two barriers, XP$_j$ and CP2, a barrier by inheritance. This means that the multiple *wh*-landing sites available for short multiple *wh*-

movement in Bulgarian and Romanian are not extraction sites, and, therefore, do not provide escape hatches for *wh*-island extraction. The Bulgarian and Romanian extraction facts, thus, constitute an additional empirical problem for Subjacency.

One question that arises is, given the analysis above, how do we account for the acceptability of long multiple *wh*-movement as in (19)? I propose that the multiply filled adjunction structure moves as a single constituent to the matrix [Spec, CP], as shown in (37).

(37) $[_{CP}\ [_{XP_i}\ [_{XP_i}\ \text{who}_i]\ \text{what}_j]_k\ [_{IP} \ldots [_{CP}\ t_k\ [_{IP}\ t_i \ldots t_j]]]]$

The analysis of *wh*-island extraction above extends to Japanese at LF. This is compatible with Nishigauchi (1986), who assumes Subjacency to rule *wh*-island extraction out.

## 2. A Unified Analysis of *Wh*-Island Extraction

In this section, developing an analysis in Kraskow (1987) (for Bulgarian), I propose a unified analysis of the *wh*-island facts in these languages that addresses the empirical and conceptual problems outlined above. Firstly, I propose that S is a bounding node universally, in *Barriers* terms, the lowest tensed IP is an inherent barrier universally, so that Subjacency uniformly rules out *wh*-island extraction in these languages. The acceptability of *wh*-island extraction, then, derives from the fact that these languages license an A'-bound *pro*, which amnesties the *wh*-island violation, as overt resumptive pronouns do in English, for example.[12] Crucially, however, the A'-bound *pro* differs from the English resumptive pronoun in that it is licensed in movement structures, as shown by the fact that these structures obey the Complex NP Constraint. This is nicely illustrated in Bulgarian, for example, which has both *wh*-relatives and *that*-relatives, each exhibiting the different strategy, as Rudin (1982) shows.

(38) Tova e momcheto deto/*na koeto misŭlta che mu dadohme bonboni...
'This is the boy that/*to whom the thought that we gave him candy...'
(Rudin 1982:V/(43))

Being A'-bound, *pro* is subject to the semantic constraint barring fronted quantifiers from binding resumptive pronouns, illustrated with English examples below.

(39) *Everyone$_i$, I like him$_i$.
(40) *Who$_i$ were you wondering whether Mary likes him$_i$?

Given this constraint, we would expect to find a quantificational/nonquantificational asymmetry in *wh*-island extraction, since the A'-bound *pro* would be licensed in the latter case, but not the former. As we have seen, however, D-linked interrogatives pattern not with non-D-linked interrogatives, but with relatives. I leave this as an open question. The asymmetric extraction pattern that we see, then, reflects the fact that the A'-bound *pro* is licensed in D-linked structures, but not non-D-linked, structures. This is illustrated below.

(41) Non-D-linked interrogative: $*[_{CP}\ wh_i\ [_{IP} \ldots [_{CP}\ wh_j\ [_{IP}\ t_j \ldots t_i]]$
(42) D-linked interrogative: $[_{CP}\ wh_i\ [_{IP} \ldots [_{CP}\ wh_j\ [_{IP}\ t_j \ldots pro_i]]$
(43) (D-linked) relative: $[_{CP}\ wh_i\ [_{IP} \ldots [_{CP}\ wh_j\ [_{IP}\ t_j \ldots pro_i]]$

Evidence in support of this analysis comes from the weak crossover (WCO) facts which exhibit the same asymmetry. Assuming WCO to diagnose the variable status of an empty category, the asymmetry supports our claim that the non-D-linked *wh*-phrases bind a variable, and the D-linked *wh*-phrases bind a *pro*. The WCO facts are shown below.

(44) *Pe cine$_i$ a certat mama lui$_i$? [Romanian]
'Whom$_i$ did his$_i$ mother scold?' (Dobrovie-Sorin 1990:(12a))
(45) Pe care băiat$_i$ l$_i$-a certat mama lui$_i$?
'Which boy$_i$ did his$_i$ mother scold?' (Dobrovie-Sorin 1987:(1.125b))

(46) *Kogo$_i$ udari majka mu$_i$? [Bulgarian]
'Whom$_i$ did his$_i$ mother scold?'
(47) Koe momche$_i$ udari majka mu$_i$?
'Which boy$_i$ did his$_i$ mother scold?'

(48) *Vad$_i$ tyckte de flesta som sett det$_i$ bra om?[13] [Swedish]
'What$_i$ did most people who had seen it$_i$ like?'
(49) Vilken film$_i$ tyckte de flesta som sett den$_i$ bra om?
'Which film$_i$ did most people who had seen it$_i$ like?'
(Engdahl 1980:VI/(39))
(50) ??Chi$_i$ pensi che la donna che lo$_i$ ama abbia tradito? [Italian]
'Who$_i$ do you think that the woman who loves him$_i$ betrayed?'
(51) ?Quale studente$_i$ pensi che la donna che lo$_i$ ama abbia tradito?
'Which student$_i$ do you think that the woman who loves him$_i$ betrayed?' (Delfitto 1990:(32b), (34b))

(52) *Mary-ga sono hito$_i$-o semeta koto-ga *dare*$_i$-o odorokaseno? [Japanese]
Mary-Nom that person-Acc criticized fact-Nom *who*-Acc surprised
'The fact that Mary criticized that person$_i$ surprised whom$_i$?'
(53) Mary-ga sono hito$_i$-o semeta koto-ga *dono hito*$_i$-o odorokaseno?
'The fact that Mary criticized that person$_i$ surprised which man$_i$?'
(Hoji 1984, cited in Pesetsky 1984:fn.23)[14]

In proposing a unified account of the *wh*-island facts under an A'-bound *pro* analysis, I have ignored a crucial way in which Romanian differs from the other languages of this group. That is, Romanian actually has an overt resumptive element in the D-linked structures. This is the doubling clitic found in declaratives and *wh*-constructions in Romanian. It is not a resumptive pronoun (see discussion above). I will take the empty category associated with the doubling clitic to be *pro* (essentially the 'invisible pronominal copy' of Steriade 1980, and compatible with the 'nonvariable' status of the empty category in Dobrovie-Sorin 1987). The analysis of *wh*-island extraction that we have proposed dovetails with the theory of quantification proposed by Dobrovie-Sorin (1987) for Romanian, and provides further evidence for the distinctions that she draws. Dobrovie-Sorin showed that the following cluster of properties distinguished *cine* ('who') structures from *care* ('which') structures in Romanian: (a) the obligatory absence vs. the obligatory presence of doubling clitics, (b) the presence vs. the absence of WCO effects, and (c) the licensing vs. the exclusion of parasitic gaps. Dobrovie-Sorin took these facts to indicate that movement is not necessarily correlated with syntactic quantification in Romanian, *cine*-phrases entering into a quantifier-variable configuration, but not *care*-phrases.[15] She proposes that this derives from the absence of structural quantifiers in Romanian.

The languages of this group also differ with respect to whether or not they license a null pronominal object in declaratives. Romanian, Bulgarian and Japanese do, but Swedish and Italian do not (the null object in Italian is arbitrary in interpretation (Rizzi 1986)). In Romanian and Bulgarian, the null object is licensed in clitic doubling configurations, and, in Bulgarian, when there is a contextually salient referent (Kraskow 1987). I leave open the question of why we do not have a *pro* in object position in declaratives in Swedish and Italian, yet we have an A'-bound *pro*.

Lastly, with regard to examples (5) and (48), some speakers accept these questions, although they find them marked or 'not natural' (Elisabet Engdahl (personal communication)). Given the preference for the cleft version of Swedish questions (Maling and Zaenen 1982, cf. Lie 1982), I propose that (5) and (48) are being interpreted as clefts, and, thereby, as D-linked.

In summary, our analysis explains the uniform failure of these languages to obey the *Wh*-Island Constraint in a straightforward and natural way, and, in addition, is compatible with the theories of Comorovski (1988, 1989) and Cinque (1989).

## FOOTNOTES

[*] I would like to thank Anthony Kroch, Richard Kayne and Beatrice Santorini for helpful discussion.

1. Examples (2), (3), (5), (14) and (15) are cited in Comorovski (1988).
2. This judgment is controversial. I return to this in section 2.
3. In (12) and (13), $o_i$ ('her') is an accusative doubling clitic.
4. Kroch (1990) argues against a syntactic account of the asymmetry by showing that the problem with *wh*-island extraction of 'non-referential' amount quantifiers, as in (i), is semantic and pragmatic in nature.
    (i) *How much did Bill wonder whether the book cost?,
5. I turn to the *Barriers* formulation of Subjacency in the next section.
6. The ungrammaticality of the D-linked *Which book did he wonder where John put?* shows that English obeys the *Wh*-Island Constraint.
7. See also Adams' (1984) proposal based on adjunction to COMP.

8. See Engdahl and Ejerhed, eds. (1982) on islands in Scandinavian.
9. See Chomsky (1986) for the further chain of definitions.
10. In subsequent structures, I omit the adjoined to VP positions.
11. See Comorovski (1989) for a different structure for Romanian.
12. This analysis differs from the *pro*-analyses of Obenauer (1985) and Cinque (1986), the latter posited for 'apparent extraction from islands.'
13. As in (5), this judgment is controversial. See discussion below.
14. Some structures show WCO effects. See Nishigauchi (1986).
15. Dobrovie-Sorin (1987, 1990) did not observe the *wh*-island extraction asymmetry above since her non-D-linked (*cine*-type) examples were extractions from subjunctive or *whether* complements and not tensed complements.

## REFERENCES

Adams, M. (1984) "Multiple Interrogation in Italian," *The Linguistic Review* 4:1-27.

Aoun, J., N. Hornstein, and D. Sportiche (1981) "Some Aspects of Wide Scope Quantification," *Journal of Linguistic Research* 1.69-95.

Bedzyk, F. (1987) "Successive Cyclic Wh-Movement in Bulgarian and Icelandic," ms., Cornell University.

Chomsky, N. (1964) *Current Issues in Linguistic Theory*, Mouton, The Hague.

Chomsky, N. (1973) "Conditions on Transformations," in S. R. Anderson and P. Kiparsky, eds., *A Festschrift for Morris Halle*, Holt, Rinehart and Winston, New York.

Chomsky, N. (1977) "On *Wh*-Movement," in P. Culicover, T. Wasow, and A. Akmajian, eds., *Formal Syntax*, Academic Press, New York.

Chomsky, N. (1981) *Lectures on Government and Binding*, Foris, Dordrecht.

Chomsky, N. (1986) *Barriers*, MIT Press, Cambridge.

Chomsky, N., and H. Lasnik (1977) "Filters and Control," *Linguistic Inquiry* 8.3:425-504.

Cinque, G. (1986) "A-Bar Bound *pro* vs. Variable," ms., Universita di Venezia.

Cinque, G. (1989) 'Long' *Wh*-Movement and Referentiality, paper presented at the 2nd Princeton Workshop on Comparative Grammar.

Comorovski, I. (1986) "Multiple *Wh* Movement in Romanian," *Linguistic Inquiry* 17.1:171-177.

Comorovski, I. (l988) "Discourse-Linking and the *Wh*-Island Constraint," NELS 19.

Comorovski, I. (1989) Discourse and the Syntax of Multiple Constituent Questions, Ph.D. dissertation, Cornell University.

Delfitto, D. (1990) Bound Pronouns and Weak Crossover, ms. (to appear in *Rivista di Linguistica*).

Dobrovie-Sorin, C. (1987) Syntaxe du Roumain: Chaînes Thématiques, Ph.D. dissertation, Université de Paris 7.

Dobrovie-Sorin, C. (1990) "Clitic Doubling, *Wh*-Movement and Quantification in Romanian," *Linguistic Inquiry* 21.3:351-397.

Engdahl, E. (1979) "*Wh*-Constructions in Swedish and the Relevance of

Subjacency," *NELS* 11.

Engdahl, E. (1980) The Syntax and Semantics of Questions in Swedish, Ph.D. dissertation, University of Massachusetts, Amherst.

Engdahl, E. (1986) *Constituent Questions: The Syntax and Semantics of Questions with Special Reference to Swedish*, D. Reidel, Dordrecht.

Engdahl, E., and E. Ejerhed, eds. (1982) *Readings on Unbounded Dependencies in Scandinavian Languages*, Almqvist and Wiksell International, Stockholm.

Hoji, H. (1984) "Discourse-Linked Quantifiers and Weak Crossover in Japanese," ms., University of Massachusetts, Amherst.

Kraskow, T. (1987) Implications of Multiple *Wh*-Movement for *Wh*-Island Violations, paper presented at the Annual Meeting of the *Linguistic Society of America*, San Francisco.

Kroch, A. (1990) "Amount Quantification, Referentiality, and Long *Wh*-Movement," ms., University of Pennsylvania.

Lasnik, H., and M. Saito (1984) "On the Nature of Proper Government," *Lingusitic Inquiry* 15.2:235-289.

Lie, S. (1982) "Discontinuous Questions and Subjacency in Norwegian," in Engdahl, E. and E. Ejerhed, eds. (1982).

Maling, J. (1978) "An Asymmetry with Respect to *Wh*-Islands," *Linguistic Inquiry* 9.1:75-89.

Maling, J., and A. Zaenen (1982) "A Phrase Structure Account of Scandinavian Extraction Phenomena," in P. Jacobson and G. K. Pullum, eds., *The Nature of Syntactic Representation*, D. Reidel, Dordrecht.

Nishigauchi, T. (1986) Quantification in Syntax, Ph.D. dissertation, University of Massachusetts, Amherst.

Obenauer, H.-G. (1985) "On the Identification of Empty Categories," *The Linguistic Review* 4:153-202.

Pesetsky, D. (1984) *Wh*-in-Situ: Movement and Unselective Binding, ms., University of Massachusetts, Amherst (published in E. J. Reuland and A. G. B. ter Meulen, eds., (1987) *The Representation of (In)definiteness*, MIT Press, Cambridge).

Rizzi, L. (1978) "Violations of the *Wh* Island Constraint and the Subjacency Condition," in C. Dubuisson, D. Lightfoot, and Y. C. Morin, eds., *Montreal Working Papers in Linguistics* 11.

Rizzi, L. (1982) Issues in Italian Syntax, Foris, Dordrecht.

Rizzi, L. (1986) "Null Objects in Italian and the Theory of *pro*," *Linguistic Inquiry* 17.3:501-557.

Rizzi, L. (1988) On the Status of Referential Indices, ms., Université de Genève.

Ross, J. R. (1967) Constraints on Variables in Syntax, Ph.D. dissertation, MIT.

Rudin, C. (l982) Complementizers and *Wh* Constructions in Modern Bulgarian, Ph.D. dissertation, Indiana University (published as Rudin 1986).

Rudin, C. (1986) *Aspects of Bulgarian Syntax: Complementizers and* Wh *Constructions*, Slavica, Columbus.

Rudin, C. (1988) "On Multiple Questions and Multiple *Wh* Fronting," *Natural Language and Linguistic Theory* 6:445-501.

Steriade, D. (1980) "Clitic Doubling in the Romanian *Wh* Constructions and the Analysis of Topicalization," *CLS* 16.

ESCOL '90 166-186

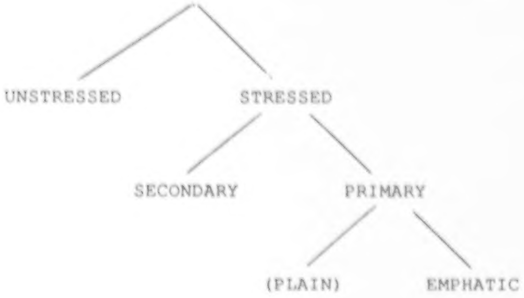
# ONE WORD'S STRENGTH IS ANOTHER WORD'S WEAKNESS: INTEGRATING SYNTAGMATIC AND PARADIGMATIC ASPECTS OF STRESS

D. Robert Ladd
University of Edinburgh

## 1. A Paradox

Consider what we might call the commonsense view of stress. According to this view, things can either be stressed or unstressed, and if they're stressed, they can be stressed to a greater or lesser extent. The 'greater or lesser extent' can probably usefully be divided into two ranked categories, which we might call primary (or main) and secondary (or reduced). Somewhere in the commonsense view we may also make provision for emphasis or contrast, which is sometimes thought of as something extra overlaid on main stress. All this is shown in (1):

(1)



I've deliberately called this the commonsense view - rather than, say, the naive view or the minimalist view - for two reasons. First, it's the view embodied in the IPA alphabet, whose primary goals are not theoretical sophistication but practical usefulness in transcription; the IPA view of stress reflects what trained phoneticians think they hear when they listen to speech. Second, the commonsense view is what nearly all linguists apply when they talk about the interaction of stress and focus (e.g. Culicover and Rochemont 1983, Gussenhoven 1983, Selkirk 1984). In these contexts people often get by very well simply capitalizing or italicizing stressed words or syllables, suggesting that for these purposes something is either stressed or it isn't.

With the commonsense view as background, however, consider the fact that for at least 250 years there have been major theoretical debates about the nature of stress. Even if we concentrate on, say, the last 50 years of these debates, it's clear that we encounter some serious problems when we try to make the commonsense view more explicit. There have been two major issues over the last 50 years: first, the relation between pitch and prominence (e.g. Bolinger 1958), and second, the consequences of metrical phonology for the description of stress patterns (Liberman and Prince 1977 - henceforth LP - and much work since then). The inevitable conclusion to be drawn from all this work in phonology and phonetics is that stress is something pretty abstract. It involves structured relations between the elements of a word or utterance, and orchestrates the prosodic cues for an entire utterance. In the words of LP (250), 'certain features of prosodic systems ... are not to be referred primarily to the properties of individual segments (or syllables), but rather reflect a hierarchical rhythmic structuring that organizes the syllables, words, and syntactic phrases of a sentence'. In other words, stress is a feature of structures, not a feature of syllables. In still other words, which will become clearer shortly, stress involves syntagmatic rather than paradigmatic distinctions. In whatever words we summarize these theoretical debates, the current views of phoneticians and certainly of phonologists allow nothing so straightforward as a statement that some syllables are stressed and some aren't.

So the paradox is this: while phonologists and phoneticians have been busy pushing their theoretical understanding of stress into new realms of abstractness and complexity, syntacticians and semanticists who are interested in stress and focus have been carrying on with the commonsense view of stress AND ALSO ADVANCING THEIR UNDERSTANDING. Many syntacticians and semanticists do acknowledge the existence of the theoretical debates in phonology and phonetics, but clearly they believe that those needn't affect their own work, and for the most part it would seem that they're right. They may apologize for their use of capital letters to indicate stress, but they do it anyway, and it doesn't seem to matter very much.

I suspect that if you asked the average syntactician working on stress and focus about this paradox, they would suggest that the situation is rather like the situation with Newtonian and Einsteinian physics. That is, stress really IS relational and abstract, but it only makes a difference in contexts that are of no syntactic relevance: you don't worry about relativity or gravity waves when you're tuning up your car, and you don't worry about the abstractness and relationality of stress when what you're really interested in is how it signals focus.

But there's another possibility, which is that this is like the wave-particle debate over the physics of light. When you consider light in certain ways it seems like a wave, and when you consider it in other ways it seems like a stream of particles, and one of the challenges for 20th century physics has been to figure out how those observations can be reconciled. In other words, I suggesting that in some way we haven't worked out yet, the commonsense view of stress and the abstract relational view of stress really AREN'T incompatible, really ARE both right. This is the claim I'd like to explore in this paper.

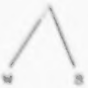
## 2. Syntagmatic phenomena in metrical phonology

First let's consider in somewhat more detail the relational or syntagmatic aspects of stress that are at the heart of metrical phonology. What is phonologically odd about stress is that it crucially involves dependencies or comparisons between different parts of a given form or utterance. In the compound *baby sitter*, the syllable *sit-* is the most prominent syllable of *sitter*, but it's less prominent than the syllable *ba-*, which is the most prominent sylalble of *baby*. It's not simply that, say, the syllable *ba-* has stress level [primary] from a paradigmatic set of possibilities, while the syllable *sit-* has stress level [secondary] from the same set. Rather, it's that somehow the very essence of the stress pattern on this phrase lies in the syntagmatic relationship between the two syllables.

More specifically, stress is CULMINATIVE, which means that it must define a single peak - a single most prominent point - within a given prosodic unit. *Baby* and *sitter* are both prosodic units, with a single peak of prominence each, but when they are combined into the prosodic unit *baby sitter* the peak of one of them must emerge as the peak of the compound. The primariness of the stress on *baby* and the secondariness of that on *sitter* are in effect mutually defining; each provides the context for the other.

This syntagmatic aspect has always fitted rather uncomfortably into phonological theory, which has grown up to deal with paradigmatic choices. But metrical phonology, beginning with LP, has substantially changed the picture. As Mary Beckman suggests in her excellent review of theories of prosodic phenomena (Beckman 1986, Chs. 1-3, to which this section of the paper owes much), what metrical phonology gives us is not so much a theory of rhythm as a way of talking about syntagmatic phenomena in phonology. The essentially syntagmatic character of stress is reflected in the relational notation

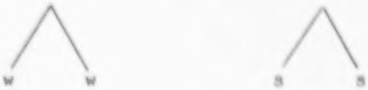
(2)



In this notation, as LP and many since them have been at pains to point out, the labels w(eak) and s(trong) do not imply any particular level of stress or any particular type of phonetic correlates, but only RELATIVE strength or prominence within a particular structure or substructure. The fact that this notation has been revealingly extended to other syntagmatic phenomena in phonology, notably 'sonority' in syllable structure, is indicative of its usefulness and its generality.

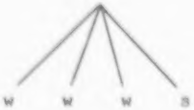
As for the specifically culminative nature of stress, it's reflected in the ban on all-weak and all-strong branching, i.e. structures like those in (3).

(3)



If every node in a tree has exactly one and only one strong daughter, then the tree has to have a single strongest point - a 'Designated Terminal Element (DTE)' in LP's terms - and that's precisely what culminativeness is all about. Note that you can still have a culminative structure even if you allow a given strong node to have multiple weak sisters, as in (4).

(4)



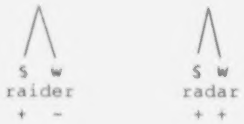
Any subtree like (4) is still going to lead unambiguously to a single most prominent terminal node. I follow Beckman in assuming that multiple branching needs to be allowed in metrical trees.

3. Metrical representation of non-syntagmatic properties

Despite the success of metrical phonology in expressing the syntagmatic aspects of stress, everyone acknowledges that, in some way, at least some properties of stress are not relational or syntagmatic at all. These aspects worked their way into the original LP metrical analysis of English stress and have been offending metrical phonologists' sense of elegance ever since. The most conspicuous problem in the description of English stress is vowel reduction, and the existence of minimal pairs like raider and radar.

LP treated cases like these in terms of a feature [+/-stress] that could be applied to terminal elements of the stress tree - syllables - more or less without regard to their place in structure. Thus:

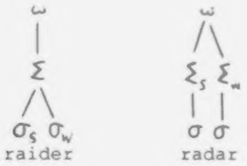
(5)



The pluses and minuses indicate whether a given syllable is stressed; you can see that the relationship strong-weak can hold between either a stressed-unstressed pair (as in raider) or a stressed-stressed pair (as in radar).

One of the earliest responses to this analysis came from Selkirk (1980). Selkirk says in effect, 'What a pity to come up with a brand new theory that replaces the feature [stress] with an obviously superior description, only to have the feature [stress] come in again through the back door to patch up some gaps in the analysis'. She proposes to get rid of the [+/-stress] feature by adding PROSODIC CATEGORIES to the abstract relational structure posited by LP. Thus in place of (5) we will have

(6)

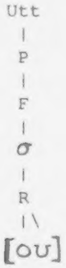


In raider, the word (ω) consists of a single stress foot (Σ), within which there is a strong-weak relation between the two syllables (σ). In radar, on the other hand, the word consists of two stress feet between which there is a strong-weak relation, and each stress foot contains only a single syllable.

The relevance of all these notational modifications for the problem of non-syntagmatic properties is that prosodic categories, unlike the purely relational nodes in the LP metrical trees, can have intrinsic - paradigmatic or nonrelational - phonetic properties defined independently of their place in structure. In this example, in Selkirk's words, 'a syllable which IS A stress foot will never be interpreted as a weak [unstressed] syllable ... [B]eing a stress foot always implies some degree of prominence'. While Selkirk herself has since moved on to other ideas<1>, I'd like to suggest that her original proposal is still the best way to integrate the paradigmatic or nonrelational aspects of stress and intonation into the syntagmatic and relational framework of the metrical analysis of prosodic structure.

Just to make clearer what I mean by prosodic categories having intrinsic phonetic properties that are definable independently of structure, take the example of the utterance Oh!. This is simultaneously an utterance, an (intonational) phrase, possibly a foot, a syllable, and a syllable rhyme. We could represent all this information in a spindly-looking tree like this:

(7)



Ungainly as this looks, it is NOT MEANINGLESS to build such a tree of non-branching labelled nodes above a terminal element, because at each level in structure we are saying something different about the phonetic properties of the utterance. The Utterance node says that it begins and ends with silence, or something of the sort. The phrase node says something about the pitch contour. The Foot node says that there is an unreduced vowel. And so on. This is the essence of what Selkirk was trying to do in her response to LP: to define prosodic categories in such a way that nonrelational prosodic properties can be integrated into metrical analyses along with the syntagmatic aspects. And that's what I want to do in order to integrate the commonsense view of stress into metrical theorizing.

## 4. Is deaccenting syntagmatic or paradigmatic?

The rest of the paper concentrates primarily on the phenomenon of deaccenting that I discussed in my thesis (Ladd 1980) - the use of reduced prominence to signal that an item is already in the discourse, given information, etc. Deaccenting is of interest in the context of this paper because, superficially, it appears to support the commonsense view of stress, and also because, on the closer inspection I gave it in my thesis, it appeared to be analysable purely in metrical syntagmatic terms. What I'll suggest here is that deaccenting does after all have a strong paradigmatic aspect to it - as suggested by the phrase 'reduced prominence' a few sentences back - but that it's inextricably entangled in a basically syntagmatic structure, in a way that can give us some insight into more general problems.

### 4.1. Deaccenting as syntagmatic strength reversal

Deaccenting is illustrated in (8-10):

(8) The only stuff written about this is in German, and I can't READ German, so I guess I'll have to work on something else.

(9) SEVEN hundred, EIGHT hundred, NINE hundred, a THOUSAND.

(10) Mary wanted to invite Bill for dinner, but John can't STAND the bastard.

In (8) and (9), German and hundred are deaccented because they're repeated in the discourse context; in (10) the bastard is deaccented because it is coreferential with Bill. In my thesis I took a fairly Bolingerian/Hallidayan view of these (cf. e.g. Bolinger 1972, 1986; Halliday 1967), saying that the location of stresses in these cases could be explained in terms of what I called DEFAULT ACCENT. In (8), for example, the stress is on read not for any 'positive' reasons, such as focus or contrast, but specifically in order to deaccent German, which would otherwise be stressed. Similarly, in (10) the stress is on stand in order to deaccent the bastard. In (9), default accent works together with focus, in the sense that seven, eight, and nine are the part of each number name that carries more information, and hence have reason to be in focus, yet simultaneously they are the location where the default accent ends up in order to deaccent hundred<2>.

As I said, this account is superficially consistent with the commonsense view of stress (note that the stresses in (8)-(10) are given in the capital-letter notation!) - in fact, most of the discussion in my thesis was based on Bolinger's decidedly paradigmatic pitch-accent analyses of these general topics. But because the LP account of the phonology of stress seemed superior in other respects to the pitch-accent view, I was concerned in my thesis to establish that deaccenting IS phonologically syntagmatic or relational, and to get away from treating deaccenting data in terms of the presence or absence of some loosely defined level of stress on this word or that. Specifically, I showed that there are certain aspects of deaccenting that are puzzling under the commonsense account, but which can be readily explained if we treat deaccenting as a REVERSAL OF RELATIVE STRENGTH IN A METRICAL TREE.

The main such problem I dealt with was the case of RIGHTWARD SHIFT of stress. In the classic case of deaccenting, stress shifts to the LEFT compared to the normal location. You can see this from the two possible replies in (11):

(11a) A Everything OK after your operation?

B Don't talk to me about it - I'd like to STRANGLE the butcher!

Here butcher is deaccented to signal that it is an epithet referring to the doctor whose presence in the discourse can be inferred. The stress is shifted to the left from the neutral placement on butcher<3>:

(11b) A Everything OK after your operation?

B Don't talk to me about it - I'd like to strangle the BUTCHER!

In some cases, however, deaccenting shifts stress to the right<4>:

(12a) A Where did you go just now?

B I took the GARBAGE out.

(12b) A What happened to all the garbage?

B I took the garbage OUT.

(13a) A Anything happen while I was out?

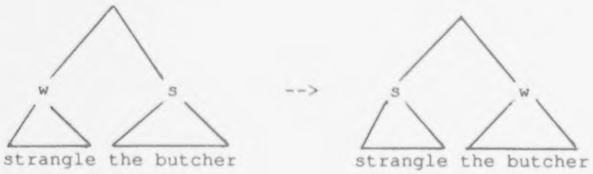
B My PARENTS called.

(13b) A Maybe we should call your parents and tell them.

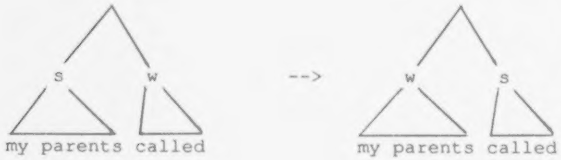
B My parents CALLED - they already know.

What I suggested about all of these is that they could be given a unified description in terms of reversed strong-weak nodes. So the trees (or relevant subtrees) in (11) and (13) will be modified as in (14a) and (14b) respectively<5>:

(14a)



(14b)



This analysis embodies the obvious syntagmatic interpretation of my title: when one word is deaccented, another word must be accented, because of the relational nature of stress patterns. For further details on this analysis, see Ladd 1980, Ch. 3.

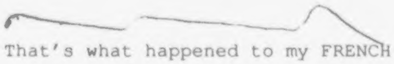
## 4.2. Deaccenting and focus as paradigmatic effects

The syntagmatic node-reversal hypothesis just outlined works for a wider range of cases than a straight leftward shift rule based on the commonsense view, but there are still problems - cases that don't fit very comfortably into the analysis in terms of reversed strong and weak nodes. Here are two examples. In (15), the context was a discussion of somebody who used to be able to speak German well but had then spent a long time living in Sweden and now spoke good Swedish but had trouble with German. My contribution to the discussion was:

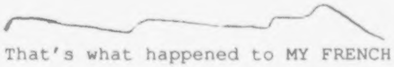
(15) That's what happened to MY FRENCH - it used to be good, but then I spent a year in Germany and ended up with good German, and now whenever I want to speak French I get German interference all over the place.

The relevant part of this discourse is the very beginning: *That's what happened to MY FRENCH*. There's clearly a double contrast or focus intended here. On the one hand, we're talking about MY linguistic abilities rather than those of the person who lived in Sweden, and on the other hand, we're talking about knowledge of FRENCH getting lost rather than knowledge of German. If we didn't intend the extra focus or contrast on *my*, *my* would be unstressed; it would be somewhat shorter, possibly with a somewhat centralized vowel, and with different F0 contours along the following lines:

(16a)



(16b)

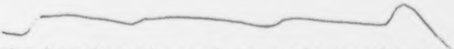


The problem for the reversed-nodes analysis is that the prominence on *my* - prominence that clearly signals some sort of focus - cannot be described in syntagmatic terms. Focus on *my* is being conveyed prosodically, but not by reversing nodes. It's not that *my* is strong relative to some sister constituent; in fact, *my* is clearly still weak relative to its strong sister *French*, and when this sentence was uttered in its original context, *my* had something that might reasonably be called 'secondary stress'. Rather, the reason we perceive *my* as focally stressed is that it is STRONGER OR MORE PROMINENT THAN IT WOULD BE IN A NON-FOCAL CONTEXT - i.e. stronger than some other paradigmatic possibility.

Another example of the same sort of thing, this one from my thesis, is based on the case of *butcher* as an epithet for 'doctor':

(17a) A Everything OK after your operation?

B Don't talk to me about it!

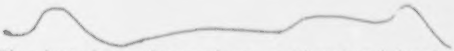


The butcher charged me a thousand bucks!

The ravages of inflation have taken the bite out of this example since I first used it, but whatever the size of the bill, the point is that we have a clearly secondary stress on *butcher* and a clear epithet interpretation. If instead of a secondary stress we have a primary stress on *butcher*, we once again get incoherent raving about the man who sells meat (cf. footnote 3):

(17b) A Everything OK after your operation?

B Don't talk to me about it!



The butcher charged me a thousand bucks!

As with the case of *my French*, it's difficult to express the prosodic difference between the epithet and non-epithet versions of *the butcher* in syntagmatic terms; it seems to depend fairly locally on the degree of prominence on *butcher*<6>. So there's a problem with the syntagmatic definitions of deaccenting and focus: in (15) and (17) they seem to be a matter of paradigmatic degrees or levels of prominence, rather than anything relational.

Notice something else about the way the paradigmatic prominence is used in these examples - the same degree of prominence can have different effects on different lexico-syntactic classes. First consider the difference between the deaccented (epithet) and neutral (literal) interpretations of *butcher* in (17a) and (17b). As I just said, the difference between these two readings is signalled here by the use of a secondary stress (deaccented) instead of a primary stress (neutral). Now consider the difference between the focused and non-focused interpretations of *my* in the phrase *my French*. This can be signalled by the presence or absence of SECONDARY stress - *my* with no stress is neutral, *my* with stress - even secondary stress - is focused. This means that the FUNCTION of secondary stress depends on what kind of lexical item we're dealing with: specifically, secondary stress means 'this is deaccented' when it occurs on a noun and 'this is focused' when it occurs on a pronoun. More generally, I suggest that the situation is something like the following:

> Function words (e.g. my) normally are unstressed, but for reasons of emphasis/focus/contrast they may acquire a stress (either primary or secondary, depending on the context). Nouns (e.g. butcher) normally have a primary (nuclear) stress, but for contextual reasons this may be reduced to a secondary stress<7>.

This, incidentally, is the paradigmatic interpretation of the phenomenon referred to in the title - one word's strength (secondary stress on a pronoun, to signal focus) is another word's weakness (secondary stress on a noun, to signal deaccenting). That's in addition to the obvious syntagmatic interpretation illustrated in the preceding section.

In any case, it now seems to me that it was a mistake to try to reduce deaccenting to a matter of relative strength - i.e. to reversal of a syntagmatic strength relation. Instead, to a considerable extent, the signalling of focus and deaccenting is based on a neutral DEGREE of prominence - for various part of speech types there's a paradigmatic choice of degree of prominence from a set of possibilities. Based on that neutral choice, focus (newness, contrast, etc.) is signalled by an increase in the degree of prominence, or promotion, while deaccenting (givenness, coreferentiality, etc.) is signalled by a decrease in the degree of prominence, or demotion.

How can we integrate an analysis like this into the metrical description of stress that we want for other reasons?

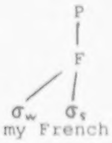
## 5. Metrical interpretation of the commonsense view of stress

In order to make the kinds of descriptive statements I've just been making, we have to be able to treat the notions of primary stress, secondary stress, and unstressed as degrees of prominence that are statable independently of any given utterance context. I propose to do this, as I suggested earlier, by defining them in terms of prosodic categories.

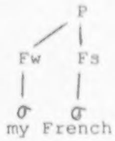
First we'll posit two prosodic categories, FOOT (F) and PHRASE (P). Foot has properties of the sort that Selkirk talked about - unreduced vowel quality and full syllable duration - and is equivalent to Selkirk's $\Sigma$. Phrase has primarily intonational correlates - it's the domain of an intonation contour. For expository purposes I'll assume here that phrase is the next higher prosodic category above foot, as in (7) above, though I'm well aware that this runs counter to the work of e.g. Nespor and Vogel 1986 and Pierrehumbert and Beckman 1988. I don't intend what follows as a definitive and all-encompassing proposal on prosodic structure, but only as an illustration of how to go about integrating the paradigmatic aspects into the relational structure of metrical phonology. Many details remain to be worked out; one crucial further point is made in sec. 6 below.

I assume that the difference between stressed and unstressed is, as Selkirk first suggested, the difference between being a foot and not being a foot. Thus the difference between the two renditions of my French could be something like the following<8>:

(18a)



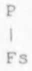
(18b)



The difference between primary and secondary stress, meanwhile, is the difference between being the strong foot of a phrase and being a weak foot. Thus in (18b), the stress on my is secondary, while that on French is primary or nuclear.

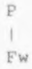
In other words, we'll define 'neutral' prominence for a noun as

(19a)



and 'reduced' or 'deaccented' prominence as

(19b)



For a pronoun, etc., neutral prominence is

(20a)

F
|
σ

which by definition cannot be deaccented or made less prominent, while increased prominence for focus, contrast, etc. is

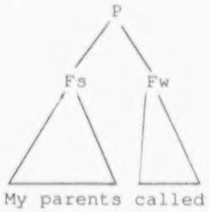
(20b)

P
|
F

The structure in (20b), with only F instead of Fw or Fs, says that the very fact of being a foot is enough to signal increased prominence on a function word. It doesn't matter whether the foot is weak or strong in the phrase (i.e. it doesn't matter whether it has primary or secondary stress). This is unlike the situation with nouns in (19a) and (19b), where the difference between weak and strong in the phrase is exactly what signals deaccenting.

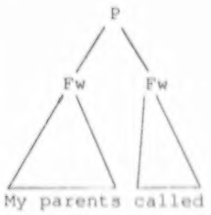
Notice that this analysis subsumes the proposal in my thesis to treat deaccenting as syntagmatic strength reversal. The reason for this is that the strength reversal will happen automatically GIVEN THE WELL-FORMEDNESS CONDITIONS ON TREES. Take the case of My parents CALLED. The neutral version of this would be

(21a)



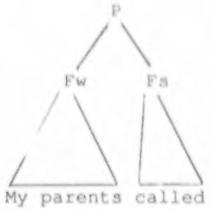
To deaccent the subject, we must give it secondary stress, i.e. put it in the configuration shown in (19b). But we can't just do that in the tree as it stands, because that would yield the ill-formed structure

(21b)



It's therefore necessary to promote the verb, yielding the correct tree:

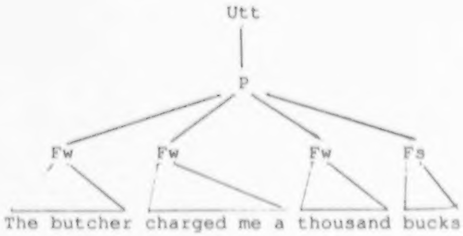
(21c)



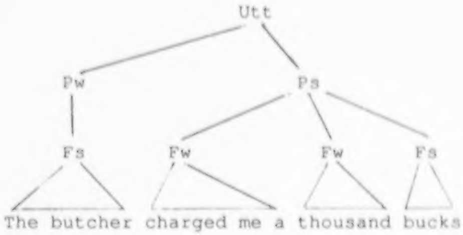
In other words, the node reversal happens indirectly, as a consequence of reducing the prominence level on the subject and the resulting violation of culminativeness. The phonological essence of deaccenting is the paradigmatic demotion from primary to secondary stress, not node reversal itself.

If we adopt this scheme, the difference in example (17), where the literal reading of butcher has a primary stress and the epithet reading has a secondary stress, will have to be treated as a matter of one phrase or two, according to these definitions:

(22a)



(22b)



This may seem like a drawback, but in fact it can be made consistent with the phonetic facts about what I'm calling primary and secondary stress (cf. the first paragraph of footnote 6). Not only that, but can be used to show how the analysis in terms of prosodic categories resolves a lot of outstanding issues between the commonsense view of stress and the abstract metrical view. Here's how:

Looked at in one way, the structure in (22b) justifies Culicover and Rochemont's view (cf. the second paragraph of footnote 6) that the primary stresses on *butcher* and *bucks* are equal, since both are the nuclei of their respective phrases. At the same time, there are good reasons to suggest that at the next higher level of structure the two P nodes are in a weak-strong relationship - as shown in the tree - which justifies the traditional view that *bucks* is the nucleus of the whole sentence. What my analysis says, in effect, is that both *butcher* and *bucks* have primary stress, yet at the same time *bucks* is stronger than *butcher*. This superficially paradoxical statement is meaningful if we take primary stress, secondary stress, and unstressed to be paradigmatic categories, and fine differences of relative prominence to be a matter of syntagmatic structure. That is the essence of the proposal I've made in this paper.

## 6. Compound prosodic domains

The kind of analysis in (22b), in which we can recognize differences of relative syntagmatic prominence between stresses of the same paradigmatic category, needs to be extended if we're going to be able to account for all the structural distinctions that can potentially be expressed by fine details of stress. This brief final section amounts to an extended footnote saying that I've thought about this and have already proposed a solution.

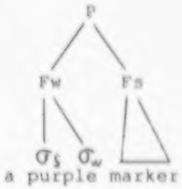
One of the central claims of the analysis of English stress presented in SPE (Chomsky and Halle 1968) is that there is no principled limit to the depth of stress subordination. That is, there's no limit on the depth of culminative relations, like the one in baby sitter, that can be reflected in the phonetic details of utterances. This claim, although it attracted a lot of unfavorable critical reactions when it was first made, went on to become one of the cornerstones of metrical phonology. The very notation of metrical phonology embodies the notion of unlimited stress subordination: there's no limit to the depth of a stress tree.

But work in other areas of metrical phonology has led a lot of investigators to a potentially contradictory conclusion, which is that there's a fixed number of prosodic category types that determines the depth of prosodic trees. This conclusion goes by the name of the 'Strict Layer Hypothesis' (SLH) (Selkirk 1984:26; Nespor and Vogel 1986:7; and cf. Pierrehumbert and Beckman 1988, ch. 6). If the SLH is right, and if the analysis I've just given is based on the set of categories in tree (7) above, then I'm incapable of expressing anything more than the three levels of stress for which I've provided definitions, plus a few additional distinctions brought about by syntagmatic prominence relations as in (22b).

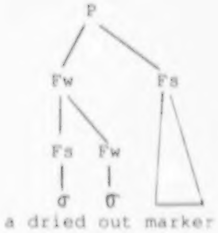
But I don't think the SLH is right. In a forthcoming paper (Ladd ms.), I've suggested on a lot of independent grounds that metrical theory needs to allow for the existence of what I call 'Compound prosodic domains' (CPD). A CPD, like a syntactic compound, is a constituent of category X whose immediate constituents are themselves of category X - like a compound foot (a foot consisting of two or more feet) or a compound phrase (a phrase consisting of two or more phrases). CPDs violate the letter of the SLH, in other words, but they still allow for a small fixed hierarchy of prosodic category types.

What this means for the analysis presented here is that we can recognize a potentially unlimited number of distinctions between stresses of the same paradigmatic category. That is, we can extend the kind of analysis in (22b) to cases like the following:

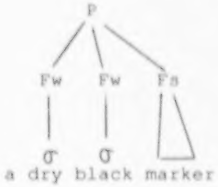
(23a)


P
Fw
Fs
$\sigma_s$
$\sigma_w$
a purple marker

(23b)


P
Fw
Fs
Fs
Fw
σ
σ
a dried out marker

(23c)


P
Fw
Fw
Fs
σ
σ
a dry black marker

If analyses like these are permitted, it's possible to recognize unlimited stress subordination AND at the same time to give clear definitions of a small number of stress categories that function paradigmatically in signalling focus and other pragmatic effects. This goes a long way toward resolving the paradox I started with, and makes it seem possible that conflicts between the commonsense view of stress and the sophisticated metrical view will ultimately wither away.

FOOTNOTES

* On stylistic grounds it will be clear that this written version differs little from my spoken presentation at the Conference, and I would like to make explicit that some of the ideas here are still in rather preliminary form. Without wanting to spread the responsibility for any of the preliminariness, I would nevertheless like to thank Steve Isard, with whom I am working on the general problem of 'syntax-prosody mapping', for good discussions of some of this material.

1. Specifically, Selkirk (1984) rejects the prosodic-category approach in favor of the so-called grid-only model. Ironically, the grid-only model once again has paradigmatic non-relational features getting attached to certain elements in a string without regard to their place in structure. Selkirk starts by assigning a pitch accent (effectively a feature [+PA], though she claims otherwise) to selected syllables, and then builds the relational grid according to where the pitch accents are.

2. I acknowledge that my term default accent for this sort of thing has been caught up in the march of lexical change, and I would like to withdraw it. Computer jargon is far more widespread now than it was in 1975, when I coined the term, and nowadays anybody encountering the term for the first time would assume that it means an accent that occurs on a particular word in the absence of specific reasons to occur somewhere else - in other words, 'normal' stress. I would welcome suggestions for a replacement term for my original meaning of default accent, since the actual analysis, if not the terminology, still seems appropriate.

3. Obviously, the 'neutral' stress placement is contextually inappropriate here, referring as it apparently does to a man who sells meat; the point is simply to illustrate the leftward shift of stress that is commonly seen in deaccenting.

4. Example (13) was primarily intended to support a claim that the neutral stress pattern in [subject] + [intransitive predicate] sentences like *My parents called* puts the main stress on the subject. This is a perennial sticking point in the analysis of English stress placement (for a review see Gussenhoven 1983; for some progress see Faber 1987) and is essentially irrelevant here. The point is simply that, when there is contextual reason to deaccent *parents*, the stress in this sentence shifts to the RIGHT relative to the neutral stress pattern seen in the 'out of the blue' context.

5. Ignoring graphical problems with the discontinuous constituency, this explanation applies to *took the garbage out* as well. With neutral stress, *garbage* is strong and the discontinuous verb *took ... out* is weak. Deaccenting *garbage* reverses this pattern, making *took ... out* strong; within that constituent, *out* is stronger than *took*, so the main sentence

stress ends up on *out*. Whether this kind of analysis can be integrated into a metrical structure that doesn't allow discontinuous constituency is well beyond the scope of this paper.

6. By any reasonable definition, both (17a) and (17b) have a pitch accent on *butcher*. In my thesis I talked about these in terms of Bolinger's taxonomy - the difference between a B-accent (epithet interpretation) and an A-accent (literal interpretation). But Bolinger's taxonomy has been misused so often that I don't want to tie my analysis to it here - instead I've just called these secondary and primary stress. These terms can be given more explicit meaning in terms of a Pierrehumbert-style tonal analysis, but this is unfortunately beyond the topic of this paper.

Actually, there is an alternative interpretation here, which is that in the epithet case we have the relationship weak-strong, whereas in the non-epithet case the stresses are equal. This would appear to be the interpretation preferred by Culicover and Rochemont 1982. I think this is undesirable because it involves allowing strong-strong as well as weak-strong relations in metrical phonology, but rather than specifically arguing against their proposal I'll suggest a solution to this below (cf. example 22b).

7. As for verbs and adjectives, in many contexts they have secondary stress as their neutral degree of prominence (cf. Schmerling 1976, Ladd 1980), but there are lots of exceptions and problems that are not relevant here.

8. I emphasize that these are only possibilities. In particular, it seems likely that in the context of the full sentence *That's what happened to my FRENCH*, the unstressed *my* would be attached to a PRECEDING foot *happened to my*. Again, the details of such syntax-prosody mismatches lie well outside the scope of the discussion here.

## REFERENCES

Beckman, Mary E. (1986). *Stress and Non-Stress Accent*. (Netherlands Phonetic Archives 7). Dordrecht, Foris Publications.

Bolinger, Dwight (1958). A Theory of Pitch Accent in English. *Word* 14: 109-149.

Bolinger, Dwight (1972). Accent is Predictable (If you're a Mind-reader). *Language* 48: 633-644.

Bolinger, Dwight (1986). *Intonation and its Parts*. Stanford: Stanford University Press.

Chomsky, Noam, and Morris Halle (1968). *The Sound Pattern of*

*English.* New York, Harper and Row.

Culicover, Peter W., and Michael Rochemont (1983). Stress and Focus in English. *Language* 59: 123-165.

Faber, David (1987). The accentuation of intransitive sentences in English. *Journal of Linguistics* 23: 341-358.

Gussenhoven, Carlos (1983). Focus, Mode, and the Nucleus. *Journal of Linguistics* 19: 377-417.

Halliday, M. A. K. (1967). *Intonation and Grammar in British English*. The Hague, Mouton.

Ladd, D. Robert (1980). *The structure of intonational meaning: evidence from English*. Bloomington, Indiana University Press.

Ladd, D. Robert (ms.). Compound prosodic domains. Submitted to *Language*.

Liberman, Mark; Prince, Alan (1977). On stress and linguistic rhythm. *Linguistic Inquiry* 8: 249-336.

Nespor, Marina, and Irene Vogel (1986). *Prosodic Phonology*. Dordrecht, Foris Publications.

Pierrehumbert, Janet, and Mary Beckman (1988). *Japanese Tone Structure* . Cambridge, Mass., MIT Press.

Schmerling, Susan F. (1976). *Aspects of English Sentence Stress*. Austin, University of Texas Press.

Selkirk, Elisabeth O. (1980). The Role of Prosodic Categories in English Word Stress. *Linguistic Iinquiry* 11: 563-605.

Selkirk, Elisabeth O. (1984). *Phonology and Syntax: The relation between sound and structure*. Cambridge, Mass., MIT Press.

ESCOL '90 187-203

# Two Analyses of Korean Verb Inflections*

Steven G. Lapointe
Wayne State University

In a recent paper, Yoon and Yoon (1990) have argued against an approach to V inflections like that proposed in Lapointe (1988), in which the scope mismatches exhibited by such elements are resolved by autolexical association in the interface between Logical Representation (LR) and Morphosyntactic Representation (MSR). Instead, Yoon and Yoon contend that facts from Korean involving the interaction of V inflections with conjunction and negation support the view proposed by Pollock (1989) and Chomsky (1989) within the Government Binding (GB) theory, in which function elements act as heads of distinct phrases in the syntax and are joined with their hosts by Head Movement, an instance of the more general rule Move $\alpha$. The purpose of the present paper is to point out a number of shortcomings with the Yoons' arguments and to show that, contrary to their claim, an autolexical analysis involving LR to morphology associations can in fact handle the data which they discuss.

The paper will proceed as follows. After briefly reviewing some basic facts about Korean morphology, I will present the analysis of V inflections that the Yoons propose, along with the data which they use to support the analysis. I will then examine a number of empirical problems which arise from their account. Next, I will turn to an autolexical analysis of the Korean V markers. The properties of these elements suggest that they are *edge inflections* – inflections that are attached to a marginal word of a phrase rather than being attached to the lexical head of the phrase in the usual way, a type of element whose properties have recently come under close scrutiny (cf. Nevis, 1985; Zwicky, 1987; Lapointe, 1990). These items show certain similarities both to regular head-attached inflections and to simple clitics. As a result, the autolexical account to be presented here will locate edge inflections with respect to these other types of elements, while remaining consistent with the general autolexical approach to head inflections.

## 1. Some Basic Facts about Korean Morphology

Korean morphology is roughly templatic; in any case, viewing it as such will not have much bearing on the subsequent discussion. The diagram in (1) summarizes the template for the V suffixes in Korean, following Yoon and Yoon.

(1) Korean V suffix template

Stem – Causative/Passive – Honorific –|| –{Tense/Aspect/RetroTense} – Mood – ||
1 2 3 4

– Quotative – Discourse suffix – Plural
5 6 7

The suffixes in slots 1 and 2 are pretty clearly straight morphological affixes, while those in slots 5-7 are equally clearly phonological clitics, i.e., independent syntactic elements that are attached by means of phonological processes. The debate concerns the status of the tense and mood markers in slots 3 and 4. Some examples taken from the Yoons' paper are given in (2).[1]

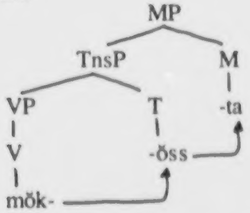
(2) a. mŏk-ŏss-ta
eat-PST-DECL
'x ate y'
b. mŏk-hi-ŏss-ta
eat-PASS-PST-DECL
'x was eaten'
c. mŏk-hi-si-ŏss-ŏss-tŏ-la-ko-yo-tŭl
eat-PASS-HON-PST-PERF-RETRO-DECL-QUOT-DISCSUFF-PLUR
'you all, I recall with surprise that the honorable one had been eaten'

A similar template can be set up for Korean Ns, although the details of that template are largely irrelevant for the issues at hand. There is, however, an interesting difference between verbal and nominal morphology in this language to which I will return in the ensuing discussion.

## 2. Yoon and Yoon's Analysis

Turning now to the Yoons' proposals, these authors want to say that the elements in slots 3 and 4 are function elements which form separate function phrases in the syntax and that the affixes merge with the V through the V's raising to the higher positions occupied by those items. So, in a sentence like (3a), the bracketed predicate would have an analysis like that sketched in (3b).

(3) a. John -i [mŏk-ŏss-ta]
John-NOM
'John ate'
b.



Here the Yoons are relying on the work of Pollock (1989) who argues for a decomposition of the GB category INFL in English and French into distinct function phrases headed by the Tense (Tns) and Agreement (Agr) elements. In Korean, we would need a Mood Phrase (MP), containing a mood marker and a Tense Phrase (TnsP), the latter of which in turn would dominate a tense marker and a VP. The V would then move up to the Tns position via Move α, with the combined form mŏk + ŏss moving up to the M position to yield the final form.

There are 2 main arguments which Yoon and Yoon present in favor of analyzing these Tns and M markers as syntactically separate elements, one based on coordination facts, the other relying on the behavior of so-called "long form" negation.

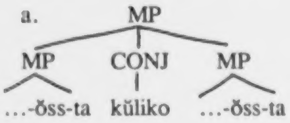
**2.1 Coordination facts.** First, the standard constituency test for coordination indicates that these elements are syntactic constituents, and not just morphemes, since they can be left behind when the remainder of the VP is conjoined. When this occurs, the Tns and M markers of the second conjunct operate over the whole conjunction. Thus, all of the Ss in (4) are grammatical.

(4) a. [John-i pap-ŭl mŏk-ŏss-ta] kŭliko [Mary-ka ppang-ŭl mŏk-ŏss-ta]
rice CONJ bread
b. [John-i pap-ŭl mŏk-ŏss]-ko [Mary-ka ppang-ŭl mŏk-ŏss-ta]
CONJ
c. [John-i pap-ŭl mŏk]-ko [Mary-ka ppang-ŭl mŏk-ŏss-ta]
all = 'John ate the meal and Mary ate the bread'

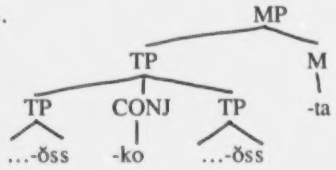
In (4a) we have two full MPs conjoined by the independent function word kŭliko, in (4b) we have two TnsPs conjoined by the particle -ko, where the M marker in the second conjunct operates over the whole conjunction, and in (4c) we have two VPs conjoined, where now the Tns and the M markers in the second conjunct operate over the remaining structure.[2]

Such an array of facts is expected under an analysis like that sketched in (3), since for (4a) we would have a structure like (5a) involving two conjoined MPs, for (4b) we would have the structure in (5b), where the single M marker lies outside the conjoined TnsPs, and for (4c) we would have (5c), where both the Tns and the M markers lie outside the conjoined VP.[3]

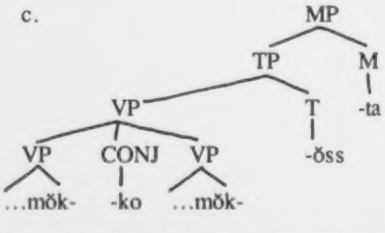
(5) a.



b.



c.



The Yoons also observe that causative and passive markers, which appear in slot 1, cannot be stranded by conjunction in this way, as is expected under this analysis, since it claims that these elements do not form independent phrases in the syntax.

**2.2 "Long form" negation facts.** The second argument that Yoon and Yoon provide involves the so-called "long form" negation, which involves a particle -či attached to the V stem followed by the stem anh- which is suffixed with the appropriate Tns and M markers; an example is given in (6).

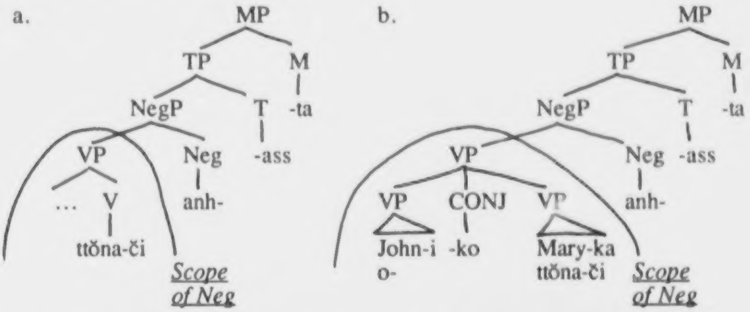
(6) John-i pap-ŭl mŏk-či anh-ass-ta
Neg
'John did not eat the meal'

The stem form anh- can appear either in both conjuncts of a coordinate structure, as in (7a), or in the final one, as in (7b). In the latter case, where no other markers occur with the V in the first conjunct, the negative applies over the whole conjunction.

(7) a. [John-i o-či anh]-ko [Mary-ka ttona-či anh]-ass-ta
come-či leave-či
b. [John-i o]-ko [Mary-ka ttona-či] anh-ass-ta
both = 'John did not come and Mary did not leave'

Since this behavior parallels that of the tense and mood markers, the Yoons assume that the negative stem also forms its own phrase in the syntax, which lies between the TnsP and the VP, as illustrated in (8a). Then, in (8b), which sketches the structure for (7b), the negative stem lies outside the conjoined VP, and the assumption is that the negative element takes scope only over phrases that it c-commands – in (8b), the conjoined VP.

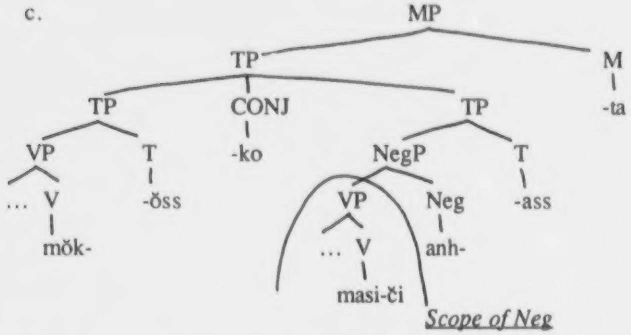
(8)



This analysis makes a further interesting prediction about the interaction of tense and negation. If the first conjunct lacks tense, the scope of a negative element in the second conjunct should include both conjuncts, while if the first conjunct includes tense, the scope of the negative should be confined to the second conjunct. This prediction proves to be correct; cf. (9a) vs. (9b) below. The structure for (9b) is given in (9c), where the scope of the negative stem clearly does not include the first conjunct, and indeed, given the Yoons' assumptions about constituency, it cannot, leading to the desired interpretation.

(9) a. [John-i pap-ŭl mŏk]-ko [Mary-ka sul-ŭl masi-či] anh-ass-ta
beer drink
'John did not eat the meal and Mary did not drink the beer'
b. [John-i pap-ŭl mŏk-ŏss]-ko [Mary-ka sul-ŭl masi-či anh-ass]-ta
'John ate the meal and Mary did not drink the beer'
≠ (9a)

c.



## 3. Problems with Yoon and Yoon's Analysis

As enticing as Yoon and Yoon's arguments are, they nonetheless suffer from several drawbacks. The problems here fall into two sets. The first involves the validity of the constituency test argument that the Yoons employ, while the second involves the existence of alternative analyses for the long form negation facts. Once these problem areas are examined, the affixes-as-functional heads analysis looks a good deal less compelling.

### 3.1 Constituency tests

**3.1.1 Other constituency tests**. Turning first to the constituency tests, there are several issues which the Yoons' arguments raise. In particular, constituency tests are most compelling when several of them combine to yield the same conclusions about which elements form syntactic constituents. Thus, if Tns and M markers are independent syntactic elements in Korean, we would expect other constituency tests to corroborate that fact. For example, (i) the placement of parentheticals, (ii) responses to questions, and (iii) pro-form substitution should all show that the Tns and M markers are syntactically separable elements. However, the first two of these fail to provide the expected support . Thus, it is not possible to insert a parenthetical or commentary marker between the V stem and a Tns or M marker. As shown in (10), the parenthetical čŏngmal 'really' may occur after the subject NP or after the object NP, but it may not occur between the V stem and the past Tns marker, nor can it appear between the past Tns marker and the M marker. However, under the Yoons' account, we would expect that such elements should occur in all of these positions in examples like (10).

(10) a. John-i čŏngmal pap-ŭl mŏk-ŏss-ta
really
b. John-i pap-ŭl čŏngmal mŏk-ŏss-ta
c.* John-i pap-ŭl mŏk-čŏngmal- ŏss-ta
d.* John-i pap-ŭl mŏk-ŏss-čŏngmal-ta

Furthermore, in question responses, it is not possible to use a V that lacks Tns and M markers. Therefore, if we ask the question in (11a), we can answer as in (11b) but not as in (11c) or (11d). Again, on Yoon and Yoon's account all of the responses in (11b-d) should be grammatical.[4]

(11) a. Spkr. A: John-i pap-ŭl mŏk-ŏss-ni?
QUEST
'Did John eat the meal?'
b. Spkr. B: Ne, mŏk-ŏss-ta
'Yes, (he) ate (it)'
c. * Ne, mŏk-ŏss
d. * Ne, mŏk

Turning now to the third constituency test, pro-form substitution, we do find support for the syntactic independence of the Tns and M elements here, but the properties of this construction in Korean appear to reduce to those of inflected Vs in coordination structures, and hence this test does not offer any support independent from that presented by the coordination test. The Yoons cite examples like (12), where the V kŭlŏhanta 'do so' is supposed to replace the preceding MP in (12a), AspectP (which we have not discussed here) in (12b), and TnsP in (12c).

(12) a. John-i ton-i manh-ass-ŏss-ko Mary-to kŭlŏhæss-ŏss-ta
J-NOM money-NOM plenty-PST-PERF-DECL-CONJ M-also do so-…
b. John-i ton-i manh-ass-ko Mary-to kŭlŏhæss-ŏss-ta
c. John-i ton-i manh-ko Mary-to kŭlŏhæss-ŏss-ta
all = 'John had plenty of money and Mary did too'

However, such facts are equally consistent with saying that the main V kŭlŏhanta is simply replacing the VP, the lowest of the phrases in Yoon and Yoon's structures, in all of these cases, with the Tns and M markers in the second conjunct operating over the whole conjunction, as they do in the non-pro-V cases we have already examined. If this is the correct approach to take for sentences with this pro-V form, then they really just reduce to cases of conjunction again, and we do not have an independent test for constituency here.

So, of the three additional constituency tests, parenthetical placement and question responses go against Yoon and Yoon's analysis, while pro-form substitution appears to reduce to the coordination test again. This is not the sort of compelling evidence that we would need in order to be convinced about the syntactic independence of the Korean Tns and M markers. Moreover, there are problems with the coordination test itself in these cases.

**3.1.2 More on coordination.** If Tns and M markers are in fact syntactic constituents in Korean, then they themselves should be conjoinable, as should bare V stems. Neither is possible, however, as shown in (13).

(13) a.* John-i pap-ŭl mŏk-ŏss-kŭliko-kess-ta
FUT
'John did and will eat the meal'
b.* John-i pap-ŭl čis- kŭliko mŏk-ŏss-ta
cook
'John cooked and ate the meal'

Thus, it is not possible to conjoin two V inflections, even if they fill the same slot, as the past and future markers -ŏss and -kess do in (13a). Likewise, in (13b) it is not possible to conjoin bare V stems with the separate function word kŭliko.

Two points need to be noted about (13b). First, bare N stems can count as whole words in Korean, whereas V stems typically require an affix in slot 4 in order to stand as full words; this is the difference between V and N morphology that I alluded to above, a difference pointed out in Cho and Morgan (1987). As a result, it is possible to conjoin bare N stems using the separate conjunction word kŭliko, as shown in (14a), taken from Cho and Morgan's paper.

(14) a. [= Cho and Morgan (1987)'s (7)]
Na-nun čæk, $p^h$yŏnči, kŭliko kongčæk-ŭl ilk-ŏss-ta
I-TOP letter notebook
'I read the book, the letter, and the notebook'
b. John-i pap-ŭl či-ko mŏk-ŏss-ta
'John cooked and ate the meal'

Thus, there is no general prohibition in Korean against using the conjunction kŭliko to conjoin unaffixed stems.

Second, it is possible to conjoin V stems, but only if the marker -ko is attached to the stem, as in (14b). However, this is only possible because the conjunction is itself a slot 4 word-forming affix in such cases, and hence we are no longer dealing with bare V stems.

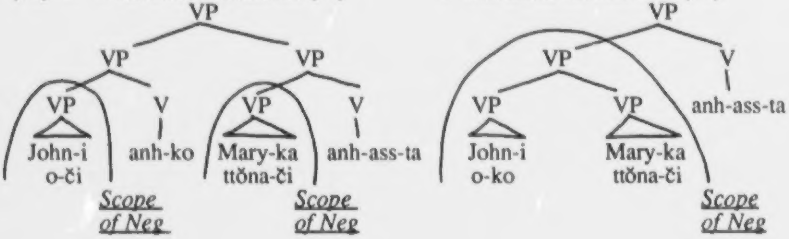
The conclusion to be drawn about the constituency tests in the case of the Korean V inflections seems then to be the one given in (15).

(15) Conclusion about constituency tests
The only standard constituency test results that support Tns and M markers as separate syntactic elements in Korean are phrasal conjunctions of the sorts in (4); all others suggest that these items are not independent syntactic entities.

Therefore, so long as we can provide a plausible independent account of the semantic distributivity facts in (4), we will have disposed with the single type of constituency fact that supports the affixes-as-functional-heads approach to Korean V markers. Such an account will be given below. Before that though, I would like to turn to an alternative analysis of the long form negation facts in (6) - (9).

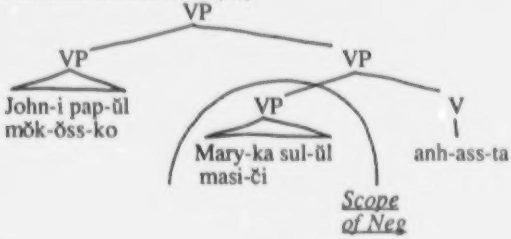
**3.2 An alternative account of long form negation**. While several possible counterproposals to the one offered by Yoon and Yoon for the long form negation facts could be explored at this point, I will focus my attention here on just one of these.[5] Suppose that the negative element anh- is a regular V stem taking a -či-marked, tenseless VP complement; then the scope facts in (7) and (9) will follow directly, as shown in (16) and (17).

(16)

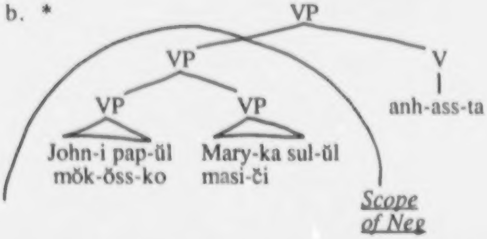


a. Alternate structure for (7a)
b. Alternate structure for (7b)

(17) a. Alternate structure for (9b)



b. *



In (16a) we simply have two conjoined VPs, each containing anh-, while in (16b) we have a conjoined VP complement to anh-, and so anh-'s scope includes the whole conjunction. In (17a), on the other hand, we have conjoined VPs in which anh- is the head of the second, and so its scope does not include the first VP conjunct. The reason why cases like (9b) cannot have a structure like (16b) here, i.e., the tree given in (17b), is that anh-'s complement has to be tenseless, but a whole VP conjunction cannot be tenseless if one of its conjuncts is tensed and the other is tenseless, as is the case here. Hence, the ungrammaticality of the unwanted structures in cases like (9b) on this account boils down to their involving instances of unlike phrases being conjoined. Notice that (19a) does not suffer from this problem, since what is conjoined there are two VPs, both of which are tensed.

Assuming that this or some other alternative analysis of long form negation can be maintained, we may conclude that the long form negation facts do not necessarily lend further support to an analysis in which the Tns and M markers are taken to be heads of separate syntactic phrases.

## 4. An Autolexical Account

**4.1 Basic distributional properties of the V markers**. The proposal that I now wish to present follows recent autolexical studies by Sadock (1985, 1989) in assuming that inflections do not have representations in the syntax but do have them in the morphology and in logical representations. If we take this assumption to apply to edge inflections as well as to regular head inflections, then it will apply to the Korean V markers we have been concerned with here. Consequently, we can avoid from the outset the problems with the standard constituency tests that Yoon and Yoon's account faces, since the V markers now do not have a syntactic existence, and so they should not behave like syntactic elements under those tests, a prediction consistent with the data we have already reviewed.

The heart of the present proposal depends on the adoption of an idea that has been argued for in a number of recent works, including Anderson (1986), Woodbury (1989), Halle (1989), and Baker (1990), namely, that the morphology involves two distinct levels of representation – morphosyntax (MSR) and morphophonology (MPR), where the morphosyntactic level includes information about morphosyntactic features, lexical categories, hierarchical relations among affixes, and affix templates, while the morphophonological level includes information about phonological features, level ordering effects, and phonological words. Of particular importance to the present study is the assumption that strict linear ordering constraints on stems and affixes hold at both of these morphological levels. In addition, I will follow Lapointe (1987, 1988, to appear/1988) in assuming that the linear ordering of words and phrases is defined on the level of Syntactic Structure (SS) and that there is a level of Logical Representation (LR) whose constituents are not constrained by linear ordering restrictions.

In accordance with recent autolexical analyses, the structures generated in these autonomous components are tied together by association lines that link lexical elements in one with lexical elements in another. These associations are governed by various general principles which require near-congruence in the structures containing these lexical elements; the fact that absolute congruence is not required permits the theory to account for various mismatches in the structural relations in the representations across levels. How this near-congruence is to be formulated has been a major concern of autolexical work. I adopt here the proposals of Lapointe (1987, to appear/1988) that (a) the notion of association plane is important for autolexical analysis, (b) within an association plane, lines do not cross, (c) for associations involving LR or SS with MSR, each lexical category type defines a separate association plane (so there is one plane for Ns, another plane for Vs, etc.), and (d) the items associated are maximal lexical categories. The extension of these assumptions in the case of MSR-to-MPR links in the present context is (a) that the entire set of MPR trees for a given sentence or phrase constitutes a single association plane and (b) that the items associated are preterminal categories, so that individual stems and affixes are linked, and not just whole words. Finally, lexical entries are allowed to lack a representation at a given level, but such gaps are marked and costly. Thus, the kinds of mismatches arising in the case of head and edge inflections discussed above – that they have representations in LR, MSR, and MPR, but not in SS – are assumed to add a cost to a grammar which includes them.

Now, the problem with edge inflections in general, and with the Korean V markers in particular, is that we want them to behave like clitics, in that they have to be associated as if they were adjacent to the first or last element in a phrase, while at the same time treating them like regular inflections in terms of their logical properties. This can be done as in (18).[6]

(18) Analysis of Edge Inflections

a. Edge inflections are like simple, bound-word clitics (Nevis, 1985; Zwicky, 1977, 1987) in that they form constituents separate from their hosts in MSR but form single constituents with their hosts in MPR.

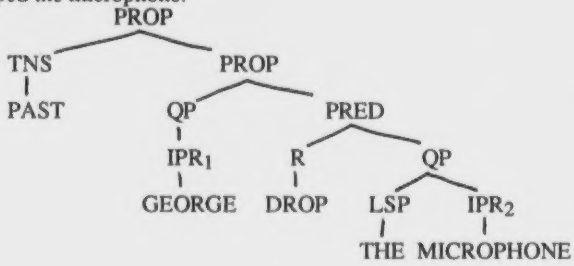
b. Edge inflections differ from bound-word clitics in not having SS representations.

c. Edge inflections are like regular head inflections in lacking a SS representation but are unlike head inflections in not combining with their hosts in MSR.

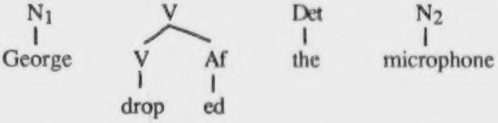
To see how this works, let us go through a case of a head inflection and a simple clitic, and then return to the Korean edge inflections. The English simple past tense marker represents a case of a head inflection. The LR for a S like (19a) would be something like (19b) (the SS has been omitted here), where the category labels abbreviate PROP(osition), PRED(icate), R(elation), Q(uantifier)P(hrase), I(ndividual)PR(edicate), and L(ogical)SP(ecifier). The MSR would then be (19c), and the MPR would be (19d); the associations are shown in (19e).

(19) a. George dropped the microphone.

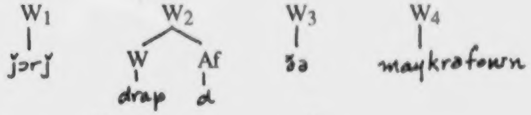
b. LR:


PROP
TNS
PROP
PAST
QP
PRED
IPR1
R
QP
GEORGE
DROP
LSP
IPR2
THE
MICROPHONE

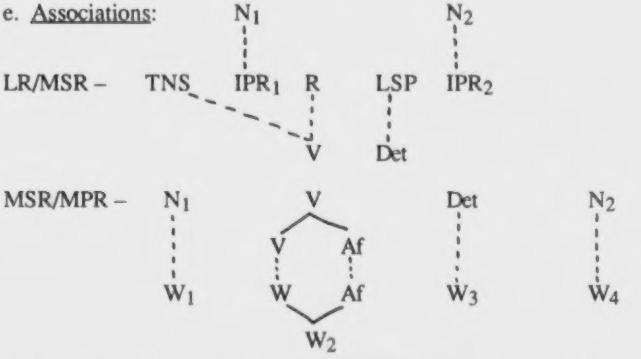
c. MSR:


N1
George
V
V
Af
drop
ed
Det
the
N2
microphone

d. MPR:


W1
jɔrj
W2
W
Af
drap
d
W3
ðə
W4
maykrəfown

e. Associations:


LR/MSR –
N1
TNS
IPR1
R
V
LSP
Det
N2
IPR2
MSR/MPR –
N1
W1
V
V
Af
W
Af
W2
Det
W3
N2
W4

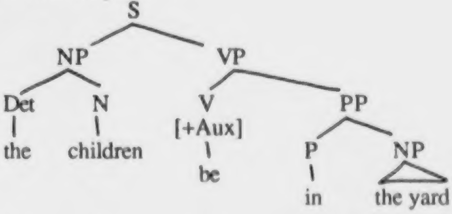
Notice in the LR/MSR links that the association lines attached to the Ns lie on a separate association plane from the lines connected to the V, in accordance with the assumptions discussed above, and so the lines connecting the TNS element and the

V and the R and the V do not cross the line connecting $N_1$ and $IPR_1$. Also in accord with those assumptions, in the MSR/MPR links preterminal categories rather than lexical categories for whole words are attached.

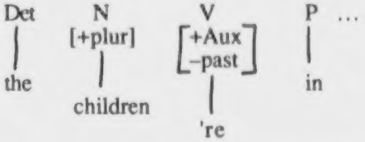
Next, (20) gives a case of a simple clitic, the English contracted auxiliary verb 're. The SS for (20a) is given in (20b) (the LR has been omitted here), with the MSR and MPR in (20c,d) and the associations in (20e).

(20) a. The children're in the yard.

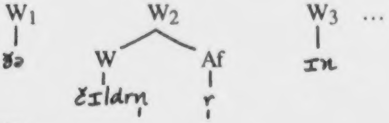
b. SS:


S
NP
VP
Det
N
V
[+Aux]
PP
the
children
be
P
NP
in
the yard

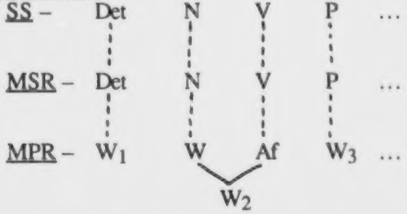
c. MSR:


Det
N
[+plur]
V
+Aux
−past
P …
the
children
're
in

d. MPR:


W1
W2
W3 …
ðə
W
Af
ɪn
čɪldrn̩
r̩

e. Associations:

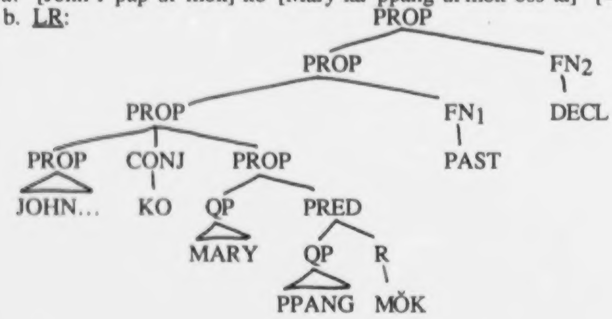

SS –
Det
N
V
P
…
MSR –
Det
N
V
P
…
MPR –
W1
W
Af
W3
…
W2

Note that the 're is treated like a regular major lexical item on both the SS and MSR levels, but it appears as an affix in MPR where it attaches to the preceding N to form a phonological word.

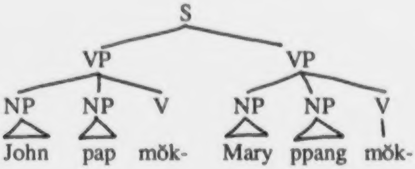
Finally, we come back to the Korean V markers as examples of edge inflections. (21a) repeats the crucial sentence in (4c); the LR, SS, MSR, and MPR then follow below, as do the associations among these levels. The Tns and M markers behave like the English past tense marker in (19) in that LR functors are directly associated with the corresponding MSR elements, but they behave like the contracted auxiliary 're in (20) in not combining with their host until MPR.

(21) a. [John-i pap-ŭl mŏk]-ko [Mary-ka ppang-ŭl mŏk-ŏss-ta] [= (4c)]

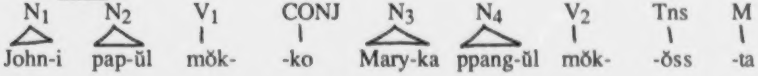
b. LR:


PROP
PROP
FN2
DECL
PROP
FN1
PAST
PROP
CONJ
PROP
JOHN...
KO
QP
PRED
MARY
QP
R
PPANG
MŎK

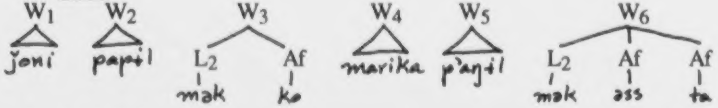
c. SS:


S
VP
VP
NP
NP
V
NP
NP
V
John
pap
mŏk-
Mary
ppang
mŏk-

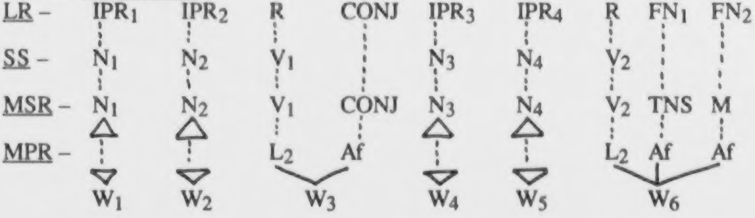
d. MSR:


N1
N2
V1
CONJ
N3
N4
V2
Tns
M
John-i
pap-ŭl
mŏk-
-ko
Mary-ka
ppang-ŭl
mŏk-
-ŏss
-ta

e. MPR:

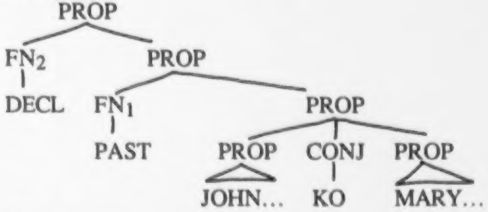

W1
W2
W3
W4
W5
W6
joni
papɨl
L2
Af
mək
ko
marika
p'aŋɨl
L2
Af
Af
mək
əss
ta

f. Associations:

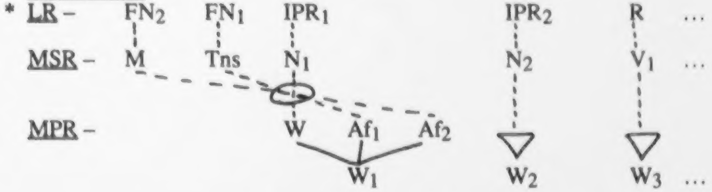

LR –
IPR1
IPR2
R
CONJ
IPR3
IPR4
R
FN1
FN2
SS –
N1
N2
V1
N3
N4
V2
MSR –
N1
N2
V1
CONJ
N3
N4
V2
TNS
M
MPR –
L2
Af
L2
Af
Af
W1
W2
W3
W4
W5
W6

Because linear order is not defined on sister constituents in LR, there is an alternative LR structure here, namely, (22a), where the functors appear on the left rather than on the right of the tree. However, as the associations in (22b) show, the resulting links are illformed.

(22) a. Alternate LR for (21a):



b. Associations:



The reason for this illformedness is easy to see. The M and Tns elements in MSR are suffixes in MPR, and indeed they have to line up in the particular order -ŏss-ta. Hence, if these items are to attach to the first stem, that for $N_1$, they cannot be attached as prefixes. However, as shown in (22b), attaching them as suffixes to $N_1$'s MPR leads to rather considerable line-crossing violations. The situation only worsens if we assume that these affixes are encoded for attaching specifically to Vs, a reasonable assumption given that they generally do not attach to Ns in this language, for then the Tns and M items in MSR will in general not be attaching to the first stem, and so even more association lines will be crossed if they are to attach to the first V.

Such considerations lead us then to the conclusions in (23) concerning this account of the Korean V markers.

(23) Consequences

a. The Korean V markers must occur phrase-marginally, since (i) they are functors in LR that lie outside the phrase and (ii) MPR links require strict adjacency.

b. The fact that these markers must appear strictly phrase-finally follows from the interaction of (i) the lexical statement that they are suffixes in MPR and (ii) the general properties of the autolexical association system.

The account presented here thus handles the basic distributional properties of the Korean V markers with a minimum of effort within the general framework of the autolexical approach by claiming that they share crucial lexical properties both with regular head inflections and with simple clitics.

**4.2 Semantic distributivity**. Assuming that the long form negation construction has an analysis like that outlined above, the final set of facts that we must account for involves the semantic distributivity properties of the edge inflections that we have been discussing. I would suggest that these facts be handled by assuming an independent interpretive principle like that in (24).[7]

(24) *Functor Distributivity*. If a functor (of a certain type) FN applies to a constituent L in LR, and L is a conjunction of the form $L_1$ CONJ $L_2$, then FN may be interpreted as distributing over each conjunct: FN($L_1$ CONJ $L_2$) —› FN($L_1$) CONJ FN($L_2$).

It is important to note that I am viewing this condition as one which derives possible semantic interpretations from a given LR as input; hence I am taking it to be part of the mapping from LRs to semantic interpretation. It therefore should not be construed as an operation mapping an "underlying" LR onto a "derived" LR, a view that would be quite at odds with the overall autolexical approach, or as an algebraic shorthand for an automodular association between constituents in LR and constituents in some other structure.

The principle in (24) indicates that only certain functors may undergo this sort of distributivity, although exactly which functors fall into this set is currently unclear. On the one hand, the standard negation operator cannot be taken as one of these functors, since the result of distributing Neg over a conjunction depends on the particular conjunction that we start with – an effect summarized in the familiar De Morgan's Law of Boolean algebra.[8] On the other hand, the Korean Tns and M markers *do* seem to behave in accordance with (24). It therefore appears that there is a distinction to be drawn between the Neg operator and tense operators in this regard. Further support for saying that tense elements in general conform to (24) derives from tense markers in English. Thus, tense markers like *was* in the progressive and *will* in the future appear to be distributable in a fashion parallel to that exhibited by the Korean V markers (25).

(25) a. Bill was [eating breakfast and reading the newspaper]
can = [Bill was eating breakfast] and [Bill was reading the newspaper]
b. Bill will [wash the dishes and take out the trash]
can = [Bill will wash the dishes] and [Bill will take out the trash]

Other cases exist in which operators exhibit the behavior summarized in (24). Thus, perhaps the best-studied example of an edge inflection, the English possessive marker, shows exactly the same sort of distributivity that the Korean V markers show. If only a single *'s* occurs at the end of several conjoined possessive NPs, as in (26a), (27a), we find two readings, one a collective reading shown in (26b), (27b), the other a distributive reading shown in (26b′), (27b′). In corresponding cases involving multiple *'s* possessives (26c), (27c), where the *'s* marker occurs at the end of each of the possessive NPs, we only find the distributive reading (26d), (27d) [= (26b′), (27b′), respectively].[9]

(26) a. Joe, Sue, and Bill's books are on the coffee table.
b. = all the books are jointly possessed by Joe, Sue, and Bill
b. = some of the books are Joe's, some are Sue's, and some are Bill's
c. Joe's, Sue's, and Bill's books are on the coffee table.
d. = (26b′)
(27) [referring to baseball teams]
a. Boston and New York's games were postponed earlier this week because of rain.
b. = the games that Boston and New York were scheduled to play against each other were postponed

b. = e.g., Boston's games with Baltimore and New York's with Cleveland were postponed
c. Boston's and New York's games were postponed earlier this week because of rain.
d. = (27b')

In addition, some VP adverbs show similar distributivity effects, as seen in (28).

(28) a. Bill slowly [ate breakfast and read the newspaper]
can = Bill [slowly ate breakfast] and [slowly read the newspaper]
b. Bill obediently [washed the dishes and took out the trash]
can = Bill [obediently washed the dishes] and [obediently took out the trash]

Minimally, then, it appears that the functors that fall within the purview of (24) include tense markers in general, elements like the English possessive marker, and certain types of adverbs. A good deal of further analysis will clearly need to be carried out in order to determine the exact range of the functors affected by (24), as well as the ultimate theoretical status of (24) itself. Nevertheless, so long as some analysis like the one presented here in terms of an independent interpretive principle can be maintained, we will have an account of the semantic distributivity of the Korean V markers which does not require them to appear as separate elements in syntactic structures and hence does not require us to adopt an analysis like the one proposed by Yoon and Yoon.

## 5. Conclusion

In the preceding discussion, we have accomplished the following. First, we have reviewed the affixes-as-functional heads approach to the Korean Tns and M markers which Yoon and Yoon present, along with the evidence which they offer to support this analysis. Next, we have observed that further constituency facts cast considerable doubt on the syntactic independence of the Tns and M markers and that even the data that the Yoons present does not offer conclusive evidence in favor of this point. Finally, we have shown that, contrary to the Yoons' claim, an autolexical analysis in which inflections do not have a syntactic representation, but do have one in the morphology and in the semantics, can account for the properties of the Korean Tns and M markers in a way that takes into consideration the fact that edge inflections share properties with both regular head inflections and simple clitics.

## FOOTNOTES

* I wish to thank Bockhee Jeon and James Yoon for their considerable help in clearing up the problems I had with the Korean examples. I alone am responsible, however, for any remaining errors of fact or analysis.

1. The gloss for (2c) cannot be taken overly seriously, since as James Yoon has pointed out to me (pers.comm.), it is unclear whether anyone would be caught saying this in real life. The following "fairy tale" context struck me as a potentially plausible one for this sentence, however. The speaker and the prince come upon a fierce dragon, who puts the speaker under a spell and at the same time plants in the

speaker's mind the thought that the dragon had eaten the prince; on waking from the trance, the speaker might then utter (2c).

2. The nonparallelism in (4a) vs. the rest arises because -ko fills the same slot as the mood markers, slot 4; so if that slot is already filled, as it is in the first conjunct of (4a) by the DECL marker -ta, it is only possible to use the independent function word kŭliko to indicate the conjunction.

3. Note that in these and subsequent structures, I am simply following the Yoons' assumption that NOM-marked NPs are located in the VP, and only TOP-marked NPs appear outside that phrase, without taking a stand on the validity of that assumption.

4. At this point, a supporter of the functional heads view might raise various objections about facts like (10) and (11), arguing that there are independent reasons why (10c,d) and (11c,d) are ungrammatical, and hence that these facts do not argue against the Yoons' analysis. Unfortunately, space limitations will not permit me to consider such objections in detail here.

5. Another possibility, suggested by Jim McCawley after Yoon and Yoon's presentation at the CLS meeting, is that (7b) and (9a) result from the application of Right Node Raising to structures in which the Neg stem anh- occurs in both conjuncts.

6. The details of which type of element forms constituents on MSR vs. MPR hold interesting consequences for some general facts about edge inflections that I will not be able to discuss here.

7. I wish to thank David Dowty for pointing out to me that this suggestion concerning semantic distributivity has something of the flavor of the type-shifting operations in categorial grammar. I have not yet had an opportunity to sort out all of the relations between the proposal I have made here and those made in categorial grammar, however.

8. In fact, Korean sentences in which the Neg stem anh- appears to be distributing over conjuncts, e.g., (7b) and (9a), really should be thought of as cases in which the Neg applies to the whole conjunction (parallel to the English It is not the case that [S and S]). Thus, (7b) is more accurately glossed as 'It is not the case that John came and Mary left'. As this more formal English translation taken together with De Morgan's Law suggests, (7b) has the interpretation "Either John did not come, or Mary did not leave, or neither occurred". The interpretation which the Yoons give and which was cited in (7b) above – 'John did not come and Mary did not leave' – represents only the third clause in the actual disjunctive interpretation for this sentence.

9. As noted in Lapointe (1990), the fact that these are the only two possibilities for the occurrence of the 's marker is a problem whose solution is likely to involve a reconsideration of the principles governing the behavior of coordinate structures and thus falls outside the scope of the present paper.

## REFERENCES

Anderson. S. (1986) "Morphological Theory," in F. Newmeyer, ed., *Linguistics: The Cambridge Survey I, Linguistic Theory: Foundations*, Cambridge University Press, London.

Baker, M. (1990) "Pronominal Inflection and the Morphology-Syntax Interface," in K. Deaton, M. Noske, and M. Ziolkowski, eds., *Proceedings of the Twenty-sixth Regional Meeting of the Chicago Linguistic Society*, Chicago, IL.

Cho, and J. Morgan (1987) "The Interaction of Syntax and Morphology in Korean VP Coordination," *Harvard Studies in Korean Linguistics II*, 27-39.

Chomsky, N. (1989) "Some Thoughts on the Economy of Derivations and Representations," unpublished paper, MIT, Cambridge, MA.

Halle, M. (1989) "An Approach to Morphology," paper presented at the 19th Meeting of NELS, Pittsburgh, PA.

Lapointe, S. (1987) "Some Extensions of the Autolexical Approach to Structural Mismatches," in G. Huck and A. Ojeda, eds., *Syntax and Semantics 20: Discontinuous Constituency, Academic Press*, New York.

Lapointe, S. (1988) "Distinguishing Types of Morphosyntactic Cooccurrences: Mismatch Resolution, Agreement, and Government," in D. Brentari, et. al., eds., *Proceedings of the Twenty-fourth Regional Meeting of the Chicago Linguistic Society, Vol. 2: Parasession on Agreement in Grammatical Theory*, Chicago, IL.

Lapointe, S. (1990) "EDGE Features in GPSG," in K. Deaton, M. Noske, and M. Ziolkowski, eds.,*Proceedings of the Twenty-sixth Regional Meeting of the Chicago Linguistic Society*, Chicago, IL.

Lapointe, S. (to appear/1988) "Constraints on Autolexical Analyses," *Linguistic Analysis* 18.

Nevis, J. (1985) *Finnish Particle Clitics and General Clitic Theory, Ohio State University Working Papers in Linguistics*, 33, Columbus, OH.

Pollock, J.-Y. (1989) "Verb Movement, Universal Grammar, and the Structure of IP," *Linguistic Inquiry* 20, 365-424.

Sadock, J. (1985) "Autolexical Syntax: A Proposal for the Treatment of Noun Incorporation and Similar Phenomena," *Natural Language and Linguistic Theory* 3, 379-439.

Sadock, J. (1989) *Autolexical Syntax: A Theory of Parallel Grammatical Representations*, in press, University of Chicago Press, Chicago, IL.

Woodbury, A. (1989) "On Restricting the Role of Morphology in Autolexical Syntax, " to appear in E. Schiller and E. Steinberg, eds., *Developments in Autolexical Syntax*, Mouton-deGruyter, Berlin.

Yoon, J. and J.-M.Yoon (1990) "Morphosyntactic Mismatches and the Function-Content Distinction," in K. Deaton, M. Noske, and M. Ziolkowski, eds., *Proceedings of the Twenty-sixth Regional Meeting of the Chicago Linguistic Society*, Chicago, IL.

Zwicky, A. (1977) "On Clitics," paper distributed by the Indiana University Linguistic Club, Bloomington, IN.

Zwicky, A. (1987) "Suppressing the Zs," *Journal of Linguistics* 23, 133-148.

ESCOL '90 204-214

# IS INFL UNIVERSAL? A CASE STUDY OF KOREAN[1]

Young-Suk Lee
University of Pennsylvania

## 1 Introduction

[Fukui 86] and [Fukui & Speas 86] claim that the striking typological differences between Japanese and English are due to the absence in Japanese of the functional categories INFL, COMP and DET. In view of the close typological affinity between Korean and Japanese, it has therefore become controversial whether Korean lacks functional categories as well. Several recent proposals such as [Ahn & Yoon 89], [Yoon 90] and [Ahn 90] argue in favor of their existence.

In this paper we focus on one of the functional categories, INFL. We argue that INFL does not exist as an independent category in the X-bar schema of Korean.[2] Instead, INFL-like elements are best analyzed as part of the category V. We then consider major grammatical consequences of this claim for the mechanism of nominative case assignment and the notion of subject. To this end we examine various types of "Multiple Subject" constructions. We hypothesize that the requirement that each clause have a subject follows from an independent principle of grammar dictating that clauses have a subject-predicate structure, which in turn is independent of the argument structure of the clause. We propose that the nominative case morpheme *-ka* in Korean is the marker for the subject of predication.

## 2 No INFL Projection

Most arguments for the existence of INFL in Korean ([Ahn 88], [Ahn & Yoon 89]) are based on the fact that Korean has overt INFL-like morphemes such as Tense and Agreement rather than whether those INFL-like elements play an active role in the grammar or not.

As [Fukui 86] suggests, however, the projection of the functional category INFL in English is justified on highly theory internal grounds. That is, a number of syntactic phenomena are explained by positing the INFL projection: nominative case assignment, subject-aux inversion, subject/object asymmetry in movements, nominative island effects, etc. Therefore, positing the INFL projection in a language must be based on the actual role that INFL-like morphemes play in the grammar rather than merely their morphological realization.

In this section we argue against the projection of INFL in Korean by showing the inertness of INFL-like morphemes in the grammar of Korean, in contrast to that of English: i.e. independence of nominative case assignment from INFL, lack of nominative island effect, and lack of subject/object asymmetry in movements.

### 2.1 Independence of Nominative Case from INFL

According to standard Government-Binding assumptions [Chomsky 81], INFL functions to assign nominative case, and this idea survives in most recent proposals in which nominative case is assigned by component categories of INFL, either Tense ([Yim 84], [Ahn 90]) or Agr ([Ahn & Yoon 89], [Yoon 90]). However, a number of constructions show that neither Tense nor Agr are responsible for nominative case in Korean.

Let us first consider the relationship between Tense and nominative case.[3]

(1) Mary-nun [ John-i party-ey ka-tolok] seltukha-yss-ta
Mary-TOP John-NOM party-LOC go so-that persuade-PST-DEC
'Mary persuaded John to go to the party.'

(2) emma-nun [aki -ka wulum-ul kuchi-key] ha-yss-ta
mom -TOP baby-NOM cry-ACC stop -CE do-PST-DEC
'Mother caused the baby to stop crying.'

(1) and (2) illustrate the so-called 'control' and 'causative' constructions respectively, where the embedded clauses are untensed. In both of these infinitival constructions, the embedded subjects *John* and *aki* are marked nominative, indicating that it cannot be Tense which is responsible for nominative case.

It might be argued that embedded clauses as in (1) and (2) contain an abstract tense morpheme (cf. [Yim 84] and [Stowell 81]). However, evidence against such an assumption comes from the 'Exceptional Case Marking (ECM)' construction in (3).

(3) na-nun [ John-i/ul chencay-ess-ta-ko] mit-ess-ta
I -TOP John-NOM/ACC genius- PST-DEC-COMP believe-PST-DEC
'I believed John to be/have been a genius.'

The matrix verb *mit-ta* 'believe' in (3) is an ECM verb. In English ECM verbs assign accusative case to the subject of the inifinitival complement since the dummy INFL *to* in the infinitival clause cannot assign nominative case to the subject. In (3), however, *John* in the complement clause may be marked either accusative or nominative even though the complement clause is tensed. This is inconsistent with the assumption that nominative case is assigned by Tense.

While Korean lacks overt English type agreement morphology (in person and gender), two morphemes have been referred to as agreement marker: the plural suffix *-tul* and the honorific morpheme *-si-*. Since the inadequacy of the plural suffix as a subject-verb agreement marker has been convincingly argued in [Hong 90], we consider only the honorific marker here.

The honorific morpheme *-si-* is usually affixed to the verbal stem when the referent of the subject is to be honored by the speaker as shown in (4).[4]

(4) apeci-kkeyse khukey usu-si-ess-ta
father-HNOM loudly laugh-HON-PST-DEC
'My father laughed loudly.'

In (4), the subject *apeci* 'father' is to be honored by the speaker and the honorific morpheme is affixed to the verbal stem *us-* 'laugh'. The honorific morpheme can also be affixed to the verb in an infinitival clause as shown in (5), making the claim that the honorific morpheme is responsible for nominative case look more plausible:

(5) na-nun [ apeci-kkeyse usu-si-key] ha-yss-ta
I -TOP father-HNOM laugh-HON-CE cause-PST-DEC
'I caused my father to laugh.'

However, (6) shows that the honorific marker *-si-* cannot be responsible for nominative case:

(6) na-nun [ apeci-lul usu-si-key ] ha-yss-ta
I -TOP father-ACC laugh-HON-CE cause-PST-DEC
'I made my father laugh.'

In (6), the subject of the embedded clause *apeci* 'father' is marked accusative despite that the honorific morpheme is present in the embedded clause. This is unexpected if the honorific morpheme assigns nominative case.

Another possible evidence against nominative case-assignment by Agr is provided by multiple subject constructions, which will be discussed in detail later.

## 2.2 No Nominative Island Effects

The 'Nominative Island Condition' ([Chomsky 80]) stated in (7) is a grammatical phenomenon which crucially hinges on the active role of Tense/Agr elements in English.

(7) A nominative anaphor in S cannot be free in S' containing S.

Condition (7), along with the assumption that INFL assigns nominative case, accounts for unacceptability of some instances of anaphor binding such as those shown in (8):

(8) a. *__John__$_i$ expects that __himself__$_i$ will win in the race.
b. *__They__$_i$ expected that __each other__$_i$ would be there.

Korean, however, does not exhibit nominative island effects in anaphor binding as exemplified in (9) and (10):

(9) John$_i$-i [cakicasin$_i$-i khun silswu-lul ha-yss-ta-ko] hwuhoyha-yss-ta
John-NOM himself-NOM big mistake-ACC do-PST-DEC-COMP regret-PST-DEC
lit. 'John$_i$ regretted that himself$_i$ made a big mistake.'

(10) John-kwa Mary$_i$-nun [selo$_i$-ka youngliha-ta-ko] sayngkakha-n-ta
John-and Mary-TOP each other-NOM smart-DEC-COMP think-PRES-DEC
lit. 'John and Mary$_i$ think that each other$_i$ is smart.'

In (9) and (10), the nominative reflexive *cakicasin* 'himself' and the nominative reciprocal *selo* 'each other' are free in the tensed embedded clauses. Nevertheless, the sentences are perfectly acceptable, demonstrating the inertness of Tense/Agr elements.[5]

## 2.3 No Subject/Object Asymmetry in Movements

Assuming the INFL projection in English gives a simple account for the subject/object asymmetry in movements out of tensed clauses, as shown in (11):

(11) a. Who$_i$ do you think that John saw __t__$_i$?
b. *Who$_i$ do you think that __t__$_i$ saw John?

In GB theory, the contrast between (11)a and (11)b is explained by subjects being in the SPEC of INFL position. The traditional view is that object traces are properly governed by the verb, while subject traces cannot be properly governed by the verb because the INFL node intervenes.

On the other hand, long-distance scrambling in Korean, which subsumes long-distance wh-movement, lacks the subject/object asymmetry. Subjects as well as objects can be freely scrambled as shown in (12) and (13) (contra to [Saito 85] for Japanese), obviating the need for INFL to explain subject/object asymmetries in movements:[6]

(12) i mokcang-i$_i$, Chelswu-ka [$t_i$ caknyen-kkaciman hayto
this meadow-NOM Chelswu-NOM last year-just until
kwaswuwen-iessta-ko] malhayssta
orchard-was-COMP said
'Chelswu said that this meadow used to be an orchard until just last year.'

(13) nwu-ka$_i$ [ ne-nun [ $t_i$ nay cacenke-lul hwumchie-kassta-ko]
who-NOM you-TOP my bicycle-ACC stole and went away-COMP
sayngkakha-ni]
think-Q
'Who do you think stole my bicycle?'

In (12), a definite nominative NP *i mokcang-i*, and in (13) a wh-subject *nwu-ka* is scrambled.

So far, we have discussed the inertness of Tense/Agr morphemes in Korean with regard to various syntactic phenomena such as nominative case-assignment, nominative island condition, and scrambling. From this we conclude that INFL in Korean does not project as an independent category in the X-bar schema and that the so-called Tense/Agr morphemes must be analyzed as a part of the category V (cf. [Lapointe 90]). In next sections we consider some consequences of this claim. In particular, we address the issues of nominative case-assignment and the notion of subject. Before doing so, we consider another grammatical phenomenon, multiple subject constructions, which serves as additional evidence for the independence of nominative case from Agr, and furthermore, can shed new light on the notion of subject in this language.

## 2.4 Multiple Subject Constructions

Korean has "Multiple Subject" constructions, where more than one NP is marked nominative in an apparently simple sentence. Various instances of this construction are exemplified in (14) through (16):[7]

(14) Subject corresponding to possessive NP

a. mwunmeyngkukka-ka yeca-ka swumeyng-i kil-ta
developed country-NOM female-NOM life span-NOM long-DEC
'As for developed countries, females' life-span is long.'

b. John-i apeci-ka tolaka-si-ess-ta
John-NOM father-NOM pass away-HON-PST-DEC
'As for John, his father passed away.'

(15) Subject corresponding to locative or dative NP

a. Los Angeles-ka hankukin-i manh-ta
Los Angeles-NOM Korean-NOM many-DEC
'As for Los Angeles, there are many Koreans there.'

b. K. tayhak-i cakum-i pwucokha-ta
K. university-NOM funding-NOM scant-DEC
'As for K university, they don't have enough funding.'

(16) Others

enehak-i chwuycik-i eleyp-ta
linguistics-NOM getting a job-NOM difficult-DEC
'As for linguistics, getting a job is difficult.'

There have been a number of proposals concerning nominative case assignment and the nature of the nominative NP's in this construction, [Yim 84], [Kang 86], [Yoon 87], and [Heycock & Lee 89] to name a few. [Yoon 87], among others, claims that the outer nominative NP's are base-generated focus phrases, and only the innermost NP's in each sentence are subjects. This distinction is based on the observation that all lexical heads (i.e. verbs and adjectives)[8] in multiple subject constructions are intransitive, hence only the innermost NP's are arguments of the lexical heads while outer NP's are not.

Although the argument/nonargument distinction invoked by Yoon seems to be the correct one, this doesn't necessarily lead to the conclusion that only arguments can be syntactic subjects. In fact, pleonastic subjects in English occur when there is no argument to fill the subject position, and the uniqueness of subject is ensured both by the mechanism of nominative case-assignment (SPEC-HEAD agreement) and by the X-bar schema. As we argued in the previous section, however, there is no INFL in Korean, hence the theoretical grounds for subject being unique are weakened significantly. Instead, we adopt an alternative approach in this paper. We posit a principle of grammar which allow multiple subjects to appear in a sentence while maintaining the idea that subjects are marked nominative.

## 3 -Ka as the Marker for Subject of Syntactic Predication

[Heycock & Lee 89] claim that the nominative case morpheme *-ka* in Korean marks the syntactic subject of a predication structure, which is independent of the argument structure of the clause. They hypothesize that there is an independent principle of grammar which dictates that clauses have a subject-predicate structure. Consequently, subject is a primitive notion in the grammar (cf. [Williams 81], [Rothstein 83], and [Heycock 90]). This analysis enables us to give a uniform account for all nominative NP's, including those in multiple subject constructions. It also gives a straightforward account of the co-occurrence of the nominative marker with postpositional/adverbial phrases.

In this section, we provide data supporting this view, define the predication structure particular to Korean, and discuss some consequences and problems of this proposal.

### 3.1 Argument Structure and Syntactic Predication

It is generally agreed that in multiple subject constructions the innermost NP in each sentence is the argument of the lexical head and the outer NP's are non-arguments. However, there are cases which appear to contradict this generalization.

Consider the examples shown in (17) and (18):

(17) a. aki-ka cam-i tul-ess-ta
baby-NOM sleep-NOM enter-PST-DEC
'The baby fell asleep.'

b. aki-ka camtul-ess-ta
baby-NOM fall asleep-PST-DEC
'The baby fell asleep.'

c. totuk-i tul-ess-ta
thief-NOM enter-PST-DEC
'A thief broke in.'

(18) a. Mary-ka hwa-ka na-ss-ta
Mary-NOM anger-NOM break out-PST-DEC
'Mary got angry.'

b. Mary-ka hwana-ss-ta
Mary-NOM get angry-PST-DEC
'Mary got angry.'

c. pul-i na-ss-ta
fire-NOM break out-PST-DEC
'Fire broke out.'

In (17)a and (18)a there are two nominative NP's *aki-ka/cam-i*, and *Mary-ka/hwa-ka*, respectively. Since the lexical heads *tul-ta* and *na-ta* are intransitive, only the innermost NP's *cam-i* and *hwa-ka*, but not the outer NP's *aki-ka* and *Mary-ka* are arguments of the lexical heads. Nevertheless, intuitively, the outer NP's are required as much as the inner NP's as an argument of the sentence, and what licenses the outer NP's is the combination of the inner NP and the lexical head. This intuition seems to be confirmed by the existence of the minimal pair sentences shown in (17)b and (18)b, where the intransitive lexical heads *camtul-ta* and *hwana-ta* are actually compounds consisting of the innermost noun and the lexical head in each sentence. While it might be argued that *tul-ta* and *na-ta* cannot be independent lexical heads, perhaps due to their lack of $\theta$-assigning abilities, examples such as (17)c and (18)c show that *tul-ta* and *na-ta* are clearly independent intransitive lexical heads.

Similar situations often arise even when there is no doubt about the $\theta$-assigning ability of the lexical head as shown in (19).

(19) a. Younghee-ka kipwun-i nappu-ta
Younghee-NOM mood-NOM bad-DEC
'Younghee feels bad.'

b. Younghee-ka maumssi-ka kop-ta
Younghee-NOM personality-NOM nice-DEC
'Younghee is nice.'

In (19)a,b, the combination of the inner nominative NP and the lexical head, i.e. *kipwun-i nappu-ta* and *maumssi-ka kop-ta*, are perceived as licensing the outer nominative NP *Younghee-ka*. The same is true of the idiomatic expressions shown in (20).

(20) a. Younghee-ka son-i khu-ta
Younghee-NOM hand-NOM big-DEC
'Younghee is generous'

b. Younghee-ka pay-ka aphu-ta
Younghee-NOM stomach-NOM ache-DEC
'Younghee feels jealous.'

Given this, we claim that what is responsible for the distribution of nominative NP's is the syntactic subject-predicate structure which is independent of the argument structure of the clause, and that the nominative case morpheme *-ka* is the marker for subject of predication. Therefore, what makes the outer nominative NP's look like subject arguments in (17) through (20) is this syntactic subject-predicate relation, not the argument structure of each lexical head.

The syntactic predication of Korean is defined below:

- The minimal unit of a predication structure (i.e. clause) is the saturated function of the lexical head.
- A clause can form a predicate with respect to another NP.
- Subjects are marked with the nominative case *-ka*.

The first clause of the definition states the core case of the predication structure. In the core case, subjects are arguments of the lexical head, and most simple sentences are instances of this type. The second clause states that a clause can be recursively defined. In this case subjects are not arguments of the lexical head. Non-argument NP's in multiple nominative constructions are licensed by a clausal predicate of this type. The first or the second clause alone, however, is not the necessary and sufficient condition for being a clause. A predication structure becomes an independent clause by having a nominative phrase as its subject, which is stated in the third clause.

This definition implies that apparent accusative subjects of clausal complements in causative and ECM verb constructions discussed in Section 2 ((3) and (6)) are not real subjects,[9] and that every sentence has at least one nominative phrase.[10] Notice that we are not defining the predication in structural terms such as mutual c-command of maximal projections, contra [Williams 81] and [Rothstein 83].

Now let us look at (21) to see how the predication structure is identified in a mutiple nominative construction:

(21) mwunmeyngkukka-ka yeca-ka swumeyng-i kil-ta
developed country-NOM female-NOM life span-NOM long-DEC
'As for developed countries, female's life-span is long.'

In (21) the innermost nominative NP *swumeyng-i* is both the argument of the lexical head *kil-ta* and the subject of the clause *swumeyng-i kil-ta*. The clause *swumeyng-i kil-ta* is in turn the predicate of the non-argument subject NP *yeca-ka*, and the clause *yeca-ka swumeyng-i kil-ta* is the predicate of the outermost subject NP *mwunmeyngkukka-ka*. Consequently there are three instances of predication in a single sentence.[11]

## 3.2 Nominative Numerals and Adverbials

Other kinds of multiple subject constructions which have not been discussed much in the literature are nominative numerals and adverbials including postpositional phrases marked nominative.

Korean has numeral expressions consisting of "a noun + a numeral + a classifier" as exemplified in (22):

(22) nwukwuna-ka [ton payk wen]-i issta
everyone-NOM money hundred CL-NOM exist
'Everyone has a hundred wen.'

The numeral NP *ton payk wen* 'a hundred dollars' in (22) can be expressed in many alternative ways, one of which is exemplified in (23):

(23) nwukwuna-ka ton-i payk wen-i issta
everyone-NOM money-NOM hundred CL-NOM exist
'Everyone has a hundred wen.'

As shown in (23), a double nominative expression corresponding to a single numeral NP is possible. The same case morpheme is suffixed to both the noun and the classifier. We consider that this can be analyzed in terms of the syntactic predication structure. That is, in (23) *payk wen-i* is the subject of the clause *payk wen-i issta*, which is, in turn, the predicate of *ton-i*, etc.

The nominative case morpheme can also co-occur with adverbials and postpositional phrases as shown in (24):

(24) a. wense cepswu-ka nayil-kkaci-ka makam-ita
application submission-NOM tomorrow-till-NOM deadline-COP
'Tomorrow is the deadline for submitting applications.'

b. ecey-ka pi-ka manhi o-ass-ta
yesterday-NOM rain-NOM a lot came
'It was yesterday that it rained a lot.'

Aside from the proposal treating nonargument nominative phrases as focus, any alternative account of nominative case assignment cannot explain the co-occurrence of the nominative case with adverbials and postpositional phrases, while our analysis treating the nominative case as the marker for syntactic subject gives a straightforward account for these examples.

## 3.3 Remaining Problems

Despite the generality of the notion of syntactic predication, there are some counterexamples to our proposal.

First, as [Maling 89] notes, the nominative (and the accusative) case can co-occur with duration/frequency adverbials as shown in (25):[12]

(25) a. pyenci-ka twu pen-i ssuici-ess-ta
letter-NOM two times-NOM was-written
'Letters were written twice.'

b. i chayk-i twu pen-i ilkhi-ess-ta
this book-NOM two times-NOM was-read
'This book was read twice.'

In (25)a,b, the nominative marked frequency adverbial *twu pen-i* doesn't seem to be the argument of the passive verbs *ssui-ta* or *ilkhi-ta* in the sense that *twu pen* do not carry the proper $\theta$-role which these lexical heads assign (probably "theme"). However, it is conceivable that *twu pen-i ssui-ta* or *twu pen-i ilkhi-ta* are perfectly well-formed predication structures, and the range of $\theta$-roles that the passive verbs assign is much wider than we generally assume.

Second, there are lexical heads which subcategorize for two arguments, both of which are marked nominative. This is shown in (26):

(26) a. John-i Mary-ka coh-ta
John-NOM Mary-NOM be fond of
'John is fond of Mary.'

b. John-i sensayngnim-i toy-ess-ta
John-NOM teacher-NOM became
'John became a teacher.'

*coh-ta* in (26)a is a so called transitive adjective. Other transitive adjectives are *kulip-ta* 'long for', *mwusep-ta* 'be afraid of', etc. As to this, we speculate that they are actually intransitive predicates. This speculation is based on the fact that most transitive adjectives can be used as independent intransitive predicates as illustrated in (27):

(27) a. Mary-ka coh-ta
Mary-NOM nice
'Mary is nice.'

b. horangi-ka mwusep-ta
tiger-NOM frightening
'Tigers are frightening.'

We would like to argue that the lexical head *coh-ta* in (26)a and (27)a is of the same sort, and the outer nominative NP *John-i* in (26)a is a predication subject licensed by the clausal predicate *Mary-ka coh-ta*.

As to (26)b, we do not have any explanation for the moment.

## 4 Summary

In this paper we have argued that Korean does not have the INFL projection in the X-bar schema, and that the nominative case *-ka* is the marker for the subject of syntactic predication, which is independent of the argument structure of the lexical head. We also gave s definition for predication particular to Korean and discussed some consequences and problems of this proposal.

## Footnotes

1. This research is partially funded by DARPA N00014-90-J-1863. I am grateful to my advisor Anthony Kroch and Dr. Aravind Joshi for supporting this research, and to Beatrice Santorini for her comments on the earlier draft. This paper has greatly benefited by Naoki Fukui's insightful comments on the earlier version of this paper, and by Caroline Heycock's work on "Subjects" in Japanese. All remaining errors are mine.

2. [Pollock 89] and [Chomsky 89] propose a more elaborated X-bar schema where Tense and Agreement—which used to be viewed as component features of INFL—project as independent categories separated by the projection of Negation. This view is also adopted by most recent proposals arguing for the existence of functional categories in Korean. Throughout this paper, however, we will use INFL as a cover term for both tense and agreement unless it is necessary to distinguish them, and our argument is intended to dispute the existence of both categories.

3. The following abbreviations are used in the glosses:

| | | | | | |
|---|---|---|---|---|---|
| HNOM: | honorific nominative | NOM: | nominative | COMP: | complementizer |
| HON: | honorific suffix | ACC: | accusative | CE: | causative ending |
| TOP: | topic marker | DAT: | dative | COP: | copula |
| NMZ: | nominalizer | GEN: | genitive | PST: | past |
| MOD: | modifier | CL: | classifier | Q: | question |

4. The prescribed usage of honorification requires the consideration of the relationship not only between the subject and the speaker but also between the subject and the hearer–when the hearer is superior to the subject (in age or social status), the speaker is not

allowed to use the honorific marker, which must indicate that the honorific morpheme is not a grammaticized subject-verb agreement marker. However, refer to [Hong 90] for a treatment of honorification as a necessary and sufficient test for grammatical subjecthood.
5. [Yang 86] ascribes the non-existence of NIC effects in Korean to the non-existence of Agr in this language.
6. Since object scrambling is uncontroversial, we do not give examples of object scrambling. Lack of subject/object asymmetry in LF movements is well attested in [Shim 87] and [Lee 87] among others.
7. The descriptive headings are for expository purposes, with no theoretical commitment to particular analyses. Refer to [Heycock & Lee 89] for a more detailed discussion of the data.
8. [Chomsky 85] p. 116 defines a lexical head as a "lexical function" that is unsaturated if it is not provided with appropriate arguments fulfilling the $\theta$-roles it assigns.
9. We leave it open how we actually analyze the accusative NP's in those cases. Some possible ways are (1) to assume that the embedded and the matrix clause form a single clause, and the accusative NP is an argument of the newly derived clause or (2) to assume that the accusative NP's are arguments of the matrix clause controlling the embedded 'pro' subjects as discussed in [Hong 90].
10. Some potential counterexamples to this claim are sentences where the subject is realized as a 'pro' or the subject co-occurs with a special particle such as *-to* 'also', *-man* 'only', *-(n)un* 'topic marker' instead of the nominative case marker.
11. Although it seems that certain semantic/pragmatic conditions are relevant in deciding the upper limit of the occurrence of nominative NP's in each sentence, we dissociate our notion of syntactic predication from semantic one.
12. Nonarguments as subjects of predication and the co-occurence of case marker with adjuncts could be interpreted in such a way that there is no clear structural distinction between adjuncts and arguments in Korean if we assume that both nominative and accusative cases are structurally assigned. cf. [Maling 89].

## References

Ahn, H-D. & H-J. Yoon. 1989. Functional Categories in Korean. In Kuno, S.

Ahn, H-D. 1990. An. *Proceedings of the 7th International Conference on Korean Linguistics.*

Baek, E-J. 1988. *Papers from the Sixth International Conference on Korean Linguistics.* Seoul: Hanshin Publishing Company.

Chomsky, N. 1980. On Binding. *Linguistic Inquiry* 11:1.

Chomsky, N. 1985. *Knowledge of Language: Its Nature, Origin, and Use.* New York: Praeger Publishers.

Fukui, N. 1986. *A Theory of Category Projection and its Application.* PhD dissertation. MIT.

Fukui, N. and M. Speas. 1986. Specifiers and Projection. In N. Fukui, T. Rapoport, and E. Sagey, eds., *MIT Working Papers in Linguistics 8.*

Hong, K-S. 1990. Subjecthood Tests in Korean. ms. Stanford University.

Heycock, C. and Y-S. Lee. 1989. Subjects and Predication in Japanese and Korean. In the *Proceedings* of the First Southern California Conference on Japanese and Korean Linguistics.

Heycock, C. 1990. Predication Subjects. PhD dissertation proposal. University of Pennsylvania.

Kang, Y-S. 1987. Stativity and Nominative Case Marking in Korean. In Kuno, S.

Kuno, S. et al., eds. 1985. *Harvard Studies in Korean Linguistics*. Seoul: Hanshin Publishing Company.

Kuno, S. et al., eds. 1987. *Harvard Studies in Korean Linguistics II*. Seoul: Hanshin Publishing Company.

Kuno, S. et al., eds. 1989. *Harvard Studies in Korean Linguistics III*. Seoul: Hanshin Publishing Company.

Lapointe, S. 1990. Two Analyses of Verb Inflection in Korean. *Proceedings of ESCOL '90*.

Lee, E-J. 1987. ECP and Subjacency in LF and Hierarchical Order of WH-Adjuncts. In Kuno, S.

Lee, Y-S. 1990. An Investigation of Scrambling in Korean. *Proceedings of the 7th International Conference on Korean Linguistics*.

Maling, J. 1989. Adverbials and Structural Case in Korean. In Kuno, S.

Rothstein, S. 1983. *The Syntactic Form of Predication*. PhD dissertation. MIT.

Saito, S. 1985. *Some asymmetries in Japanese and their theoretical implications*. PhD dissertation. MIT.

Shim, Y-H. 1988. On LF Movement. In Baek, E-J.

Stowell, T. 1981. *Origins of Phrase Structure*. PhD dissertation. MIT.

Williams, E. 1980. Predication. *Linguistic Inquiry 14:2*.

Yang, I-S. 1972. *Korean Syntax: Case Marking, Complementation and Relativization*. PhD dissertation. University of Hawaii.

Yang, D-W. 1986. hankwuke-uy tayyongsalon (A Discussion of Korean Anaphors). *kwukehak (Korean Linguistics)* 15: 41-162.

Yim, Y-J. 1985. Multiple Subject Constructions. In Kuno, S.

Yoon, J. 1987. Some Queries Concerning the Syntax of Multiple Subject Constructions in Korean. In Kuno, S.

Yoon, J-Y. 1990. *Korean Syntax and Generalized X-bar Theory*. PhD dissertation. The University of Texas at Austin.

ESCOL '90 215-226

# VOWEL UNDERSPECIFICATION IN JIYUAN CHINESE

Yen-Hwei Lin
Michigan State University

## 0. Introduction

Many studies have demonstrated the need for underspecification in phonology. Especially in autosegmental phonology and lexical phonology, underspecification of features plays a very important role. Recently there have been some interesting discussions regarding the extent to which underlying segments are underspecified (e.g., Steriade 1987, Clements 1988, Archangeli and Pulleyblank 1989, and Mester & Ito 1989). The central questions are: (i) how much do we underspecify? (ii) what types of features are underspecified? There are essentially two competing views in recent work on this issue. One the one hand, radical underspecification (e.g. Archangeli & Pulleyblank 1986, 1989) requires maximal underspecification. It maintains that all predictable features and feature values must be underspecified; namely, only the least number of features and feature values are present underlyingly. Therefore, redundant features are left unspecified and only one value, either plus or minus, of the contrastive features may occur underlyingly. Restrictive underspecification or contrastive underspecification (e.g., Steriade 1987, Mester & Itô 1989), on the other hand, underspecifies only redundant features, and features which function contrastively are specified with both plus and minus values. The types of evidence for restrictive underspecification range from morpheme structure constraints, syllable structure co-occurrence restrictions, to the association of a morphemic palatal feature in Japanese.

In this paper, I would like to present another type of evidence in favor of restrictive underspecification. By examining the formation of *zi* and *er* nouns in the Jiyuan dialect of Chinese (He 1981), I propose that the underlying representations of the *zi* and *er* suffixes in Jiyuan should be [+back, +round] and [-back,+round] respectively. Given that the back feature in Jiyuan functions contrastively and that both plus and minus values of the back feature are present for the *zi* and *er* morphemes in underlying representation, the proposed analysis is consistent with the restrictive underspecification theory. In the following, the Jiyuan vowel system will be introduced, and an analysis of the formation of Jiyuan *zi* and *er* nouns will be presented.

Section 2 argues that radical underspecification makes wrong predictions for the derivations of Jiyuan *zi* and *er* nouns, and the last section gives the conclusion.

## 1. Jiyuan vowels and *zi* / *er* suffixation

Jiyuan belongs to the Mandarin dialect group in Chinese. Its vowel system is very similar to standard Mandarin and the Beijing dialect. The five vowels are /i/, /ü/, /u/, /ə/, and /a/. (1.a.) is the underspecified system I assume.

(1) Jiyuan underspecified vowels

| a) | i | ü | u | ə | a |
|---|---|---|---|---|---|
| H | + | + | + | - | |
| R | - | + | + | | |
| B | - | - | + | | |
| L | | | | | + |

| b) | i | ü | u | ə | a |
|---|---|---|---|---|---|
| R | | + | + | | |
| B | - | - | | | |
| L | | | | | + |

The specifications in (1.a.) are based on the principles of restrictive underspecification. For our purpose, we focus only on the features [back] and [round]. The three high vowels are front unrounded, front rounded and back rounded. Both [back] and [round] features function contrastively to distinguish the high vowels. On the other hand, [back] and [round] are not contrastive for the non-high vowels since there are only one mid vowel and one low vowel. The non-high vowels are therefore not specified for [back] and [round].

In comparison, (1.b.) is the underspecified system within the radical underspecification framework. In Jiyuan, schwa is the epenthetic vowel, so it is left unspecified. Based on the feature minimization principle (Archangeli 1984), only three features, [back], [round] and [low], are needed to distinguish these five underlying vowels. Note that only one value of each feature is present. The missing values are supplied through derivations by phonological rules, redundancy rules or complement rules. We will show in Section 2 that a system like (1.b.) poses some problems in analyzing Jiyuan *zi* and *er* suffixation

In Chinese, *zi* and *er* are usually suffixed to a noun stem without changing much of the meaning of the stem. Sometimes, the *er* suffix indicates a diminutive form. In most Mandarin dialects, *zi* and *er* nouns are derived by suffixing the syllables *zi* and *er*. However, in some dialects, including Jiyuan, the formation of *zi* or *er* nouns is achieved by segmental feature change of the stem. (2) provides a comparison of *zi* and *er* nouns in Beijing Mandarin and Jiyuan Mandarin. In Beijing Mandarin, *zi* and *er* nouns are formed by suffixing the syllable [tsɨ] and the retroflex coda [r], while in Jiyuan, segmental feature changes from /a/ to /ɔ/ and to /æ/ signal the *zi* and *er* nouns respectively.

| (2) | stem | *zi*-noun | | stem | *er*-noun | |
|---|---|---|---|---|---|---|
| Beijing: | tʂua | tʂua tsɨ | 'claw' | xua | xuaɻ | 'picture' |
| Jiyuan: | tʂua | tʂuɔ | 'claw' | xua | xuæ | 'picture' |

(3) gives some more examples. The left hand column shows the *zi* nouns, and the right hand column the *er* nouns. Note that only segments in the rimes are subject to any segmental change. The processes involved are complex, here I will focus only on those examples that are relevant to our discussion.[1] These examples are (3 a.-d).

(3) Alternations under *zi* and *er* noun formation (Tones are omitted) (He 1981)

| | stem | *zi*-noun | | stem | *er*-noun | |
|---|---|---|---|---|---|---|
| a. | pi | piːu | 'nose' | pi | piʏ | 'nose'[2] |
| b. | xwa | xwɔ | 'flower' | ma | mæ | 'horse' |
| c. | xə | xɔ | 'box' | xə | xɐ | 'box' |
| d. | tɕin | tɕiːŋ | 'gold' | ɕin | ɕĩʏ | 'heart' |
| e. | pan | pã | 'board' | pan | pɐ | 'board' |
| f. | faŋ | fɔ̃ | 'house' | faŋ | fæ̃ | 'house' |
| g. | tɕʰun | tɕʰuːŋ | 'skirt' | tɕʰun | tɕʰũʏ | 'skirt' |

(3.a.) seems to indicate that the *zi* suffix is a high back rounded/u/, and the *er* suffix is the high front rounded /u/ ([ʏ]). However, /u/ and /u/ do not appear in many other examples. In (3.b.) the low vowel becomes rounded in the *zi* form, and fronted in the *er* form. As shown in (3.c.), the mid vowel also becomes rounded in the *zi* form, and is fronted and rounded at the same time in the *er* form. The backing effect in deriving a *zi* noun is also evident in (3.d.), where the alveolar nasal becomes a velar nasal in the *zi* form.

(4) gives some examples showing the changing patterns of the rimes when the *zi* and *er* nouns are formed. We will focus only on (4.a-e). In general, it seems that backing and/or rounding occur in the *zi* forms (4.a.c.e), while fronting and/or rounding are evident in the *er* forms (4.b.d.f). Jiyuan appears to make use of front and back to differentiate the *zi* and *er* nouns. The derived forms under *zi* noun formation and *er* noun formation are thus in a front/back contrast, and rounding plays an important role in both cases. Note also that high and non-high vowels behave differently with respect to the feature change process. The asymmetry is evident in (4.a.b) and (4.c.d.): the high vowels do not undergo any feature change.

| (4) | stem rime | | *zi* rime | | stem rime | | *er* rime |
|---|---|---|---|---|---|---|---|
| a) | i, iʔ | ---> | iː u | b) | i | ---> | iY |
| | | | | | u | ---> | uY |
| c) | a, aʔ, ə | ---> | ɔ | d) | a, aʔ | ---> | æ |
| | | | | | ə | ---> | ø |
| e) | in | ---> | iː ŋ | f) | in, iŋ | ---> | ĩY |
| | ün | ---> | uːŋ | | un, uŋ | ---> | ũY |
| g) | an | ---> | ã | h) | an | ---> | ø |
| i) | aŋ | ---> | ɔ̃ | j) | aŋ | ---> | æ̃ |

How do we then account for the formation of Jiyuan *zi* and *er* nouns, a phenomenon so different from most other Mandarin dialects? *Zi* suffixation in dialects related to Jiyuan may provide a clue. Consider the examples of *zi* suffixation in Chengzhou and Yuanyang given in (5). In these two dialects, the *zi* suffix is a high back rounded /u/, which becomes a post-nuclear glide in the *zi* nouns.

(5) *zi* suffixation in Chengzhou (Li 1963)

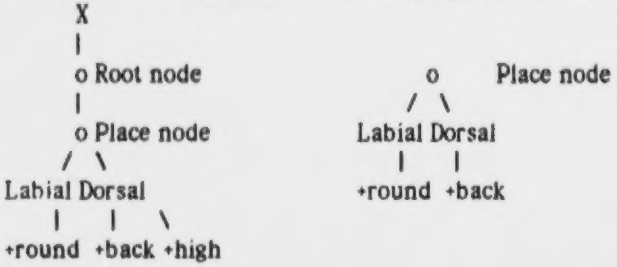
| | stem | | | *zi* | | *zi*-noun | | |
|---|---|---|---|---|---|---|---|---|
| a. | ua | (13) | + | u | ---> | uau | (13) | 'socks' |
| b. | pə | (42) | + | u | ---> | pau | (42) | 'neck' |
| c. | çüɛ | (13) | + | u | ---> | çuau | (13) | 'boots' |
| d. | pi | (42) | + | u | ---> | piəu | (42) | 'nose' |

*zi* suffixation in Yuanyang (Li 1963)

| | stem | | | *zi* | | *zi*-noun | | |
|---|---|---|---|---|---|---|---|---|
| e. | ṣua | (24) | + | u | ---> | ṣuau | (24) | 'brush' |
| f. | po | (42) | + | u | ---> | pau | (42) | 'neck' |
| g. | tçie | (42) | + | u | ---> | tçiau | (42) | 'eggplant' |
| h. | pi | (42) | + | u | ---> | piou | (42) | 'nose' |

Li (1963) states that suffixation of /u/ in these two dialects has the same function as suffixation of *zi* in Beijing Mandarin. My hypothesis is that in Chengzhou and Yuanyang, the *zi* suffix is a full segment /u/, as illustrated in (6.a.), while in Jiyuan the *zi* suffix is a degenerate form of /u/; that is, a morpheme consisting of only [+round, +back] (6.b.). Even though I have not found any dialect that uses the front rounded /u/ as an *er* suffix, given the front/back contrast of Jiyuan *zi* and *er* forms, I hypothesize that the *er* suffix in Jiyuan is [-back,+round], a degenerate form of the front rounded/u/.

(6) a. -*zi* :/-u/ (Chengzhou) b. -*zi*: degenerate /-u/ (Jiyuan)



The proposed rule system needed to derive Jiyuan *zi* and *er* nouns is given in (7). Since the feature change always affects the right edge of the stem, I consider the morphological process to be suffixation. The suffix here is not a full segment, however, but consists of only a few features. Suffixation of features means associating the features to the right most segment of the stem, as shown in (7.b.) Note that feature association here is proposed to be a feature filling process, i.e. a non-feature changing rule. Several phonological rules and redundancy rules then apply to derive various surface forms.

(7) Morphological process: suffixation

The rule system:

a. V insertion (VI) ø ---> V / V ___ ] + [αbk, +rd]

b. Feature Association (FA): .....X ]$_{stem}$
(feature filling)
\
[αbk, +rd]

c. Redundancy Rule (RR) [ ] ---> [+high]

d. Vowel Nasalization (VN) V C
| \ ‡
[-hi] [+nas]

(8) gives three sample derivations under *zi* suffixation. In (8.a.), the stem vowel /i/ is already specified with [-back,-round], so the feature filling association rule (7.b.) cannot associate the suffix to the vowel /i/. An empty slot is inserted and serves as the docking site of the suffix. The redundancy rule (7.c.) then supplies the [+high] specification. Recall that the low vowel does not have any backness and rounding specifications. The features of the suffixs is then associated to the low vowel directly. The low vowel becomes back rounded, as shown in (8.b.). (8.c.) shows that the alveolar nasal receives [+back] and becomes a velar nasal. I assume that [+round] cannot be associated to a nasal segment since it is not compatible with nasals in Chinese, *ŋʷ.

(8) a. i ---> i:u

Suffixation ---> VI ---> FA

V] + [+bk,+rd] V **V** V V
| | | \
i ([-bk]) i [+bk,+rd] i [+bk,+rd]

---> RR ----> Output

V V G V
| | | |
i [+bk,+rd,**+hi**] i u (---> [i:u])

b. a ---> ɔ

```
Suffixation --->  FA      --->    Output

V] + [+bk,+rd]    V               V
|                 |               |
a                 a               ɔ
[+lo]              \
                  [+bk,+rd]
```

c. in --> i:ŋ

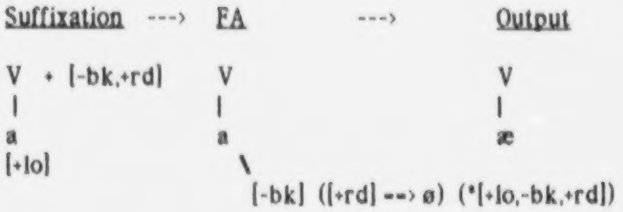
```
Suffixation --->  FA      --->    Output

V C] + [+bk,rd]   V C             V  C
| |               | |             |  |
i n               i n             ı  ŋ     (--> [i:ŋ])
                     \
                     [+bk]  ([+rd] --> ø) (*[+nas,+rd])
```

Three derivations under *er* suffixation are given in (9). The rule system is essentially the same. A glide is added to the stem with a high vowel (9.a.). The low vowel is fronted and the mid vowel is fronted and rounded (9.b.c.).[3]

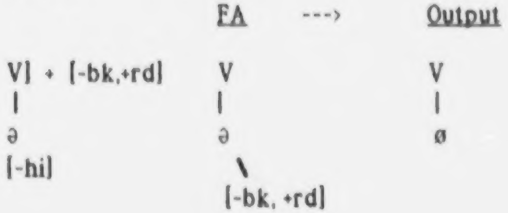
(9) a. u --> uY

```
Suffixation --->  VI      --->    FA

V]  + [-bk,+rd]   V V             V  V
|                 |               |   \
 u                u   [-bk,+rd]   u  [-bk,+rd]
[+bk,+rd]

            --->  RR          --->  Output

                  V  V              V V
                  |  |              | |
                  u [-bk,+rd,+hi]   u Y
```

b. a --> æ


Suffixation ---> FA ---> Output
V + [-bk,+rd]
a
[+lo]
V
a
[-bk] ([+rd] --> ø) (*[+lo,-bk,+rd])
V
æ

c. ə --> ø



## 2. Against radical underspecification

The main idea of the proposed analysis is that Jiyuan *zi* and *er* nouns are derived by suffixation of feature-sized morphemes. One could argue, however, that different feature make-ups can be posited for the *zi* and *er* suffixes. For instance, it seems redundant to posit both [+back] and [+round] for the *zi* suffix, and one may be tempted to posit only [+back] for *zi* and derive [+round] by the redundancy rule: [+back] --> [+round]. Besides, if radical underspecification is adopted, only one value of [back] is allowed underlyingly. Therefore, as far as the feature [back] is concerned, in the Jiyuan vowel system, either the back rounded /u/ gets the [+back] specification or the front unrounded /ü/ gets the [-back] specification. Let us now examine the consequences of adopting radical underspecification, and positing different underlying forms for the *zi* and *er* suffixes.

Suppose the *zi* suffix is simply [+round], then the underlying specifications of Jiyuan vowels would be like (10). Recall that this is the same system given in (1.b.) based on the principles of radical underspecification. Given this underspecified system, the *er* suffix is the same as in our proposal, i.e., [-back, +round]. The *zi* suffix, however, contains only [+round].

(10) (=(1.b.)) If /-*zi*/ = [+round], /-*er*/ = [-back, +round]

| | i | u | u | ə | a |
|---|---|---|---|---|---|
| R | | + | + | | |
| B | - | - | | | |
| L | | | | | + |

Consider now how to derive the *zi* forms of the non-high vowels and the alveolar nasal. (11.a.) shows that the *zi* forms of the mid and low vowels may be derived correctly if the *zi* suffix is posited as simply [+round] underlyingly. The correct forms are given in parentheses. In the case of nasals, however, it is obvious that backness, instead of rounding, is involved under feature suffixation (11.b). Positing /-*zi*/ as [+round] cannot derive the velar nasal we expect. As a result, the underspecified system for Jiyuan vowels in (10) should be rejected.

(11) *zi* suffixation:[+rd] association

| | | | [+rd] association | | RR:[+rd] --> [+bk] | |
|---|---|---|---|---|---|---|
| a. | [+lo] | ---> | [+lo, +rd] | --> | [+lo,+rd,+bk] | (a --> ɔ) |
| | [ ] | ---> | [+rd] | --> | [+rd,+bk] | (ə---> ɔ) |
| b. | [n] | ---> | N/A (*[n$^w$]) | (in ---> i: ŋ) | | |

We now explore another possibility. The underspecified vowel system would be like (12) if we do not strictly follow the feature minimization principle (Archangeli 1984), but still require minimization of feature values. That is, all four features are present, but only one value per feature is allowed. The *zi* suffix would then consist of only [+back]. Since /-*zi*/ is [+back] based on (12), and there should be no [-back], the opposite value, in underlying representation, the *er* suffix would contain only [+round].

(12) If /-*zi*/ =[+back], /-*er*/ =[+round]

| | i | u | u | ə | a |
|---|---|---|---|---|---|
| H | | | | - | |
| R | | + | | | |
| B | | | + | + | |
| L | | | | | + |

This hypothesis, as is demonstrated in (13.a), correctly accounts for all the feature changes of the alveolar nasal as well as the mid and low vowels under *zi* suffixation. There are, however, problems with such an analysis. First, (12) implies that the high front unrounded vowel /i/ is the epenthetic vowel. To my knowledge, there is no evidence for such a claim. Second, the redundancy rule: [+back]-->[+round] makes all back vowels rounded. (13.b.) shows that in this language mid and low back vowels surface as unrounded in the unsuffixed forms. Since a redundancy rule applies across the board to all segments subject to the rule at any point of the derivation, then applying this redundancy rule would derive incorrect forms for the unsuffixed words 'mother' and 'goose'. Rounding of mid and low vowels occurs only in the suffixed forms; therefore, it makes more sense to consider [+round] a property of the suffix rather than a feature specification provided by the redundancy rule.

(13) *zi* suffixation: [+bk] association

| | | [+bk] association | | RR: [+bk] --> [+rd] |
|---|---|---|---|---|
| a. | n ---> | ŋ | | N/A (in --> i: ŋ) |
| | [+lo] ---> | [+lo,+bk] | --> | [+lo,+bk,+rd] (a --> ɔ) |
| | [-hi,+bk] --> | N/A | --> | [-hi,+bk,+rd] (ə--->ɔ) |

b. /ma/--> [ma] 'mother' [+lo] --> [+lo,+bk,-**rd**]
*[mɔ] *[+lo, +bk, +**rd**]
/ə/ --> [ə] 'goose' [-hi,+bk] --> [-hi,+bk,-**rd**]
*[ɔ] *[-hi,+bk,+**rd**]

Third, if the *er* suffix is simply [+round], then the correct *er* form for the schwa cannot be derived. Consider the derivation in (14). Based on the specifications in (12), the schwa is already specified with [+back]. The correct derived form should be the front vowel [ø], as indicated in the parentheses. Since the redundancy rule is a feature filling rule, it cannot replace [+back] with [-back] in a feature changing way. Consequently, the underspecified systems based on radical underspecification, (10) and (12), should both be rejected.

(14) *er* suffixation: [+rd] association

| | [+rd] association | RR: [+rd] --> [-bk] | |
|---|---|---|---|
| [-hi,+bk] --> | *[-hi,+bk,+**rd**] | N/A | (ə ---> ø) |

## 3. Conclusion

We have argued in the previous sections that the *zi* and *er* suffixes should be [+bk,+rd] and [-bk,+rd] respectively. The presence of both plus and minus values of [back] in the underlying representations of the *zi* and *er* suffixes supports restrictive underspecification. Consider also the asymmetrical behavior of the high vowels and non-high vowels under *zi* and *er* suffixation. The high vowels do not undergo any feature change (15.a.b.), while the mid and low vowels are the segments subject to feature association (15.c.d). Restrictive underspecification naturally accounts for this asymmetry: the non-high vowels in Jiyuan are precisely the ones without any underlyingly specifications for [back] and [round], and thus are most susceptible to the feature filling of any back/round specifications.

(15) *zi* suffixation   *er* suffixation
a) i ---> iː u   b) i ---> iY / u ---> uY
c) a, ə ---> ɔ   d) a ---> æ / ə ---> ø

In conclusion, as far as the Jiyuan data are concerned, restrictive underspecification not only makes a better predication for the feature compositions of the *zi* and *er* suffixes, but also accounts for the asymmetrical behavior of the high and non-high vowels with respect to *zi* and *er* suffixation.

Even though this study, together with several others, has presented evidence in favor of restrictive underspecification, the theory in its current form is not perfect, and remains to be modified. There are cases where we do not want both values of a contrastive feature to be present underlyingly, e.g., the feature [voice] in Japanese (Itô and Mester 1986), the Yoruba [ATR] (Archangeli and Pulleyblank 1989). Clements (1988) suggests that those features which function prosodically may be underspecified even when contrastive. Mester and Itô (1989) propose that some features, e.g., [voice], may be privative features. There seems to be good thinking toward a solution to possible problems of restrictive underspecification. More empirical studies are certainly needed to test these proposed modifications of restrictive underspecification.

## Footnotes

1. For the complete data and a detailed analysis of Jiyuan *zi* and *er* nouns, see Lin (1989, 1990).

2. [Y] is a lax front rounded glide.

3. I assume that [+low, -back, +round] is ill-formed. Feature configuration constraints (Archangeli and Pulleyblank 1986) that prohibit some combinations of features in a segment are considered to be an explanation for the filters in (8.c.) and (9.b.).

## References

Archangeli, D. (1984) Underspecification in Yawelmani: Phonology and Morphology, Doctoral dissertation, MIT, Cambridge, Massachusetts.

Archangeli, D. and D. Pulleyblank (1986) "The Content and Structure of Phonological Representations," ms., University of Arizona and University of Southern California.

Archangeli, D. and D. Pulleyblank (1989) "Yoruba Vowel Harmony," Linguistic Inquiry 20, 173-217.

Clements, G. N. (1988) "Toward a substantive theory of feature specification," Proceedings of the North Eastern Linguistic Society 18.79-93.

He, W. (1981) "Jiyuan Fangyan Jilue," ("A Description of the Jiyuan Dialect,") Fangyan 5-26.

Itô, J. and R. A. Mester (1986) "the Phonology of Voicing in Japanese," Linguistic Inquiry 17, 49-73.

Li, R. (1963) Hanyu Fangyan Diaocha Shouce (Manual of Survey of Chinese Dialects), Kexue Press, Beijing.

Lin, Y-H. (1989) Autosegmental Treatment of Segmental Processes in Chinese Phonology, Doctoral dissertation, University of Texas, Austin.

Lin, Y-H. (1990) "Deriving the *Zi* and *Er* Nouns in Jiyuan Mandarin", paper presented at the Second Northeast Conference on Chinese Linguistics, University of Pennsylvania.

Mester, R. A. and J. Itô (1989) "Feature Predictability and Underspecification: Palatal Prosody in Japanese Mimetics," Language 65,258-293.

Steriade, D. (1987) "Redundant Values," Chicago Linguistic Society 23, 339-362.

ESCOL '90 227-239

# Italian Psych Verbs in a Theory of Predication*

Edward J. Rubin
Cornell University

## 1. Introduction.

Recently, the study of psychological predicates has generated much interest (cf. Belletti and Rizzi (1988), Farrell (1989), Franco (1990), Pesetsky (1990) and references cited therein). However, a satisfactory treatment which does not need to resort to otherwise unmotivated syntactic processes is still lacking. In this paper I develop a lexical characterization of these predicate types which allows their syntactic behaviors to be explained by independently motivated syntactic means.

The psych verb types that will be considered in this paper are exemplified in (1-3):

1) Io lo temo. (class 1)
I it/him fear
2) Questo lo preoccupa. (class 2)
this it/him worries
3) Questo gli piace. (class 3)
this to him/them pleases

The division into into three classes of verbs which has been assumed in the examples above is based on their well-known differences in characteristics and behaviors in various types of constructions which will be examined below (and see also, for example, Belletti and Rizzi (1988)). Both the class of verbs exemplified by *temere* 'to fear' (henceforth class 1) and the one exemplified by *preoccupare* 'to worry' (henceforth class 2) have nominative subjects and accusative objects. The class of verbs characterized by *piacere* 'to please' (henceforth class 3) is associated with two nominals, one in the nominative and one in the dative.[1]

Auxiliary selection reveals parallel behavior among transitives, unergatives and verbs of classes 1 and 2 on the one hand, and among ergatives and verbs of class 3 on the other. When verbs in Italian are in perfect tenses, their perfect auxiliary is either *avere* 'to have' (henceforth A) or *essere* 'to be' (henceforth E). The following examples demonstrate the auxiliation of the various verb types:

4) Mario ha parlato a Gianni. (unergative)
M. has-A spoken to Gianni
'Mario spoke to Gianni.'
5) Mario Andretti ha preso la terza posizione. (transitive)
M. A. has-A taken the third position
'Mario Andretti has taken the third position.'
6) Mario ha temuto i fulmini. (class 1)
M. has-A feared lightening bolts
'Mario feared lightening bolts.'
7) Mario ha preoccupato i suoi genitori. (class 2)
M. has-A worried his parents
'Mario worried his parents.'
8) La posta è arrivata. (ergative)
the mail is-E arrived
'The mail has arrived'
9) Lo spettacolo è piaciuto a Mario. (class 3)
the show is-E pleased to Mario
'The show pleased Mario.', 'Mario liked the show.'

Though both classes 1 and 2 appear at first to be equivalent to transitive verbs, there are several ways in which class 2 verbs do not act like transitives, while class 1 verbs do. First, class 1 verbs can appear with the passive auxiliary *venire* 'to come', while class 2 verbs can not. Compare the transitive verb in (10) with (11-12):

10) la casa viene dipinta (da Gianni) (transitive)
the house comes painted (by Gianni)
'the house is painted (by Gianni).'
11) Questa scelta viene rispettata (dalla maggioranza degli elettori). (class 1)
this choice comes respected (by the majority of the voters)
'This choice is respected (by the majority of the voters)' (Belletti and Rizzi (1988))
12) *Gianni viene preoccupato (dalla tempesta) (class 2)
Gianni comes worried (by the storm)
'Gianni is worried (by the storm).'

Class 2 verbs are also unable to undergo causativization in the same way that ordinary transitives, unergatives, and class 1 verbs can. Compare the transitive verb in (13) and the unergative verb in (14) with the examples of classes 1 and 2 in (15) and (16). Note that under causitives the subject of the class 2 verb cannot be expressed as a post-verbal dative in the manner of the subject of a transitive or a class 1 verb, nor can it be expressed as a post-verbal accusative in the manner of an unergative. Note also that in general two arguments may not appear post-verbally with the same case.

13) a. Marco ha fatto mischiare le carte a Gianna. (transitive)
M. made to shuffle the cards to Gianna
'Marco made Gianna shuffle the cards.'
b. *Ho fatto mischiare le carte Gianni
(I) made to shuffle the cards Gianni

14) a. Questo ha fatto parlare Maria a Marco. (unergative)
this made to speak Maria to Marco
'This made Maria speak to Marco.'
b. *Ho fatto parlare a Maria a Gianni
(I) made to speak to Maria to Gianni

15) Questo lo ha fatto temere ancora di più a Mario. (class 1)
this him/it made fear even more to Mario
'This made Mario fear him even more' (Belletti and Rizzi (1988))

16) *Questo lo ha fatto preoccupare ancora di più (a) Mario (class 2)
this him made worry even more (to) Mario
'this made Mario worry him even more' (Belletti and Rizzi (1988))

Also compare the ergative verb in (17) with the example of class 3 verbs in (18):

17) Ho fatto entrare Mario in piscina (ergative)
(I) made enter Mario into the pool
'I made Mario enter the pool'
18) Di solito, un buon cuoco fa piacere ogni piatto del pasto al cliente (class 3)
Usually a good cook makes please each dish of the meal to the customer
'A good cook usually makes each course of the meal please the customer.'

Finally, class 2 verbs differ from class 1 and transitive verbs in their interpretation in constructions with an anaphoric clitic. Class 1 and transitive verbs allow a reflexive or reciprocal reading with an anaphoric clitic, while class 2 verbs have inchoative readings in such constructions. Compare examples (19) and (20) on the one hand with (21) on the other:

19) Gianni si lava. (reflexive reading) (transitive)
G. himself washes
20) Gianni si teme. (reflexive reading) (class 1)
G. himself fears
21) Gianni si preoccupa di questo. (inchoative reading) (class 2)
G. himself worries of this
'Gianni worries/gets worried about this.'

In summary, then, psych verbs of classes 1 and 2 pattern alike and contrast with class 3 with respect to the perfect auxiliary that appears when the verb is in a compound tense. Furthermore, psychological predicates of class 2 differentiate themselves from class 1 predicates in that these latter, like transitives, allow *venire* 'to come' as a (passive) auxiliary, while class 2 verbs don't. Under causativization, each of the three psych verb classes patterns differently, class 1 with transitives, class 3 with ergatives, class 2 with no other type. Class 1 allows a reflexive/reciprocal reading with an anaphoric clitic, like (some) transitive verbs, but class 2 verbs have an inchoative reading in such constructions.

What is needed is a characterization of psych verbs that will provide an explanation of the above-mentioned facts by adopting mechanisms which rely on independently motivated principles of grammar. This characterization must obviously treat class 1 verbs as similar to transitives in the relevant respects, class 3 verbs as similar to ergatives in the relevant respects, and class 2 verbs as having, on one hand, aspects which are similar to unergatives and transitives, and on the other, aspects which are different from those types.

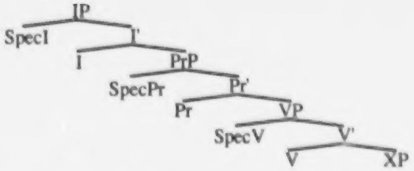
## 2. A Theory of Predication

Before the details of the characterization of the three classes of verbs under consideration can be given, I must introduce the framework of structural configurations and lexical representations which make possible an explanation of the attested patterns of behavior. I shall adapt the framework in Bowers (1990), which is both an attempt to unify two lines of thought concerning the nature of small clauses (for the first see, for example, Bach (1979), Dowty (1978, 1982), and Larson (1988), for the second, see Williams (1975), Chomsky (1981), and Stowell (1981) among many others) and an attempt to unify the syntactic and semantic characterization of main and secondary predication.

### 2.1. Predication as a Functional Category.

Bowers observes that there is much evidence (see Pollock (1989), among others) that there is a functional category intermediate between I and V. He argues, contrary to Pollock, against analyzing this intermediate category as AGR. Instead, he posits that this intermediate category is an independent functional category which he calls Pr(edication). Following Chierchia (1985, 1989a), Bowers posits that the function of this category is that of the predication relation. In other words, $Pr^0$, a predication functor, changes the type of an expression at logical form (lf, and not LF, the GB syntactic level of representation) from $\pi$ (a property) to <e,p> (an unsaturated propositional function). $Pr^0$ may take as a complement any category that may act as a property, that is, any YP with a lexical head (V,A,N,P). Thus main predication in English and Italian can be represented as occuring in the structure in (22). A PrP which is not the complement of INFL will be an instance of secondary predication.

22)



In a spirit similar to Larson (1988), Bowers asserts that direct internal arguments are base-generated in SpecV. Thus, Bowers posits that structural nominative case is assigned to SpecI and structural accusative is assigned to SpecV. In addition to these case positions, I will assume that structural dative is assigned to the complement of V position in Italian, and that this case is realized on dative nominals as the preposition-like affix 'a'.[2]

Bowers, following Grimshaw (1989), claims that θ-role assignment is compositional and proceeds from the innermost to the outermost θ-role in a θ-structure. This assignment is local in that a lexical category assigns its θ-roles to elements in argument positions that it m-commands. For Bowers the argument positions of a verb, for example, are sister of V, SpecV, and SpecPr, proceeding from innermost to outermost. Thus the θ-structure associated with a verb is represented as in (23), where $\theta_1,\ldots\theta_n$ represent θ-roles, positions inside brackets indicate argument positions, and the embedding within brackets indicates relative 'closeness' to the assigner, i.e. the innermost θ-role is embedded within the most brackets.

23) $[[[\ \theta_3\ ]\ \theta_2\ ]\ \theta_1\ ]$

When a verb has no θ-role to assign to an argument position, then the relevant position in the representation in (23) would remain empty. Bowers further assumes that a verb must raise before it has access to information concerning whether a θ-role is needed in a given, previously non-local, domain. In this way he assures that even verbs which do not assign external θ-roles will raise to $Pr^0$. Thus a verb with the θ-structure in (23) would assign $\theta_3$ to its sister, $\theta_2$ to its specifier, and $\theta_1$ to SpecPr after it raises to $Pr^0$.

### 2.2. Some examples.

Given the X-bar structure in (22) and the formalism concerning θ-structure discussed above, we can now consider how the D-structures of various types of Italian verbs are represented in Bowers' framework. The transitive verb *nascondere* 'to hide' would have the θ-structure in (24) and the sentence in (25) would have the D-structure in (26):

24) Nascondere: $[[[\ \ ]\ \theta_2\ ]\ \theta_1\ ]$. $\theta_2$ = patient, $\theta_1$ = agent.

25) Gianni nasconde i libri
Gianni hides the books
'Gianni is hiding the books.'

26) $[_{IP}\ e\ [_{I'}\ \text{PRES}\ [_{PrP}\ \text{Gianni}\ [_{Pr'}\ e\ [_{VP}\ \text{i libri}\ [_{V'}\ [\ \text{nasconde}\ ]\ ]]]]]]$

The unergative verb *ridere* 'to laugh' has the θ-structure in (27), and the sentence in (28) has the D-structure in (29).

27) Ridere: $[[[\ ]\ ]\ \theta_1\ ]$. $\theta_1$ = agent.

28) Gianni ride
Gianni laughs
'Gianni is laughing.'

29) $[_{IP}\ e\ [_{I'}\ \text{PRES}\ [_{PrP}\ \text{Gianni}\ [_{Pr'}\ e\ [_{VP}\ e\ [_{V'}\ [\ \text{ride}\ ]\ ]]]]]]$

Finally, the unaccusative verb *arrivare* 'to arrive' has the θ-Structure in (30), and the sentence in (31) has the D-structure in (32):

30) Arrivare: $[[[\ ]\ \theta_2\ ]\ ]$ $\theta_2$ = theme.

31) Gianni arriva
Gianni arrives
'Gianni is arriving.'

32) $[_{IP}\ e\ [_{I'}\ \text{PRES}\ [_{PrP}\ e\ [_{Pr'}\ e\ [_{VP}\ \text{Gianni}\ [_{V'}\ [\ \text{arriva}\ ]\ ]]]]]]$

External arguments base-generated in SpecPr and the internal arguments of unaccusative verbs base-generated in SpecV will have to raise to SpecI at S-structure in order to acquire nominative case.

One important aspect of this theory is its ability to maintain and generalize the so-called VP-internal subject hypothesis (see, for example, Koopman and Sportiche (1988)) while retaining the distinction between internal and external arguments. Since θ-role assignment is local, and therefore the $V^0$ must raise to $Pr^0$, either to assign a θ-role to the external argument position or at least to determine that no θ-role needs to be assigned there, the PrP can be partially considered an extension of the VP (or the $X^{max}$ of whatever lexical category it selects as complement). That is, since PrP is an entity of type p (a proposition) by virtue of the fact that its head is a predication functor, it might be equated with the concept of a 'complete functional complex' (CFC) (Chomsky (1986)).[3] With these characterizations we might be able to formalize the VP-internal subject hypothesis more generally as stating that a subject is (must be) generated in the minimal CFC which contains the lexical item which assigns it a θ-role. In this fashion we retain the distinction between an external θ-role (assigned to SpecPr) and internal ones (assigned to SpecV or the complement of V position).

## 3. A Characterization of Italian Psych-Verbs.

### 3.1. Psych Verbs of Classes 1 and 3.

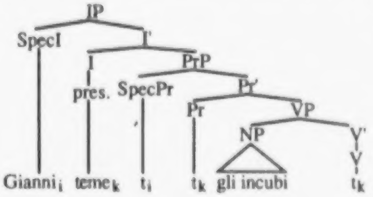
Now we have available the apparatus for characterizing the three classes of Italian psych verbs. It can be noted that classes 1 and 3 do not need any special treatment or discussion here, since their behavior is equivalent to that of transitives and ergatives, respectively. Thus the θ-structure and θ-roles of the class 1 and 3 verbs can be represented as in (33) and (34):

33) Class 1: $[[[\ ]\ \theta_2\ ]\ \theta_1\ ]$ $\theta_1$ = experiencer, $\theta_2$ = theme.

34) Class 3: $[[[\ \theta_3\ ]\ \theta_2\ ]\ \ ]$ $\theta_2$ = theme, $\theta_3$ = experiencer.

Class 1 verbs assign a theme θ-role to SpecV (object position) and an experiencer θ-role to SpecPr (external argument position), i.e. to the same positions to which standard transitive verbs assign their θ-roles. In Italian SpecV receives structural accusative case and the external argument can raise from SpecPr to SpecI to receive structural nominative (again just as in the case of other transitives). Thus the tree in (35) is an S-structure representation of the sentence in (36), which involves a class 1 verb.

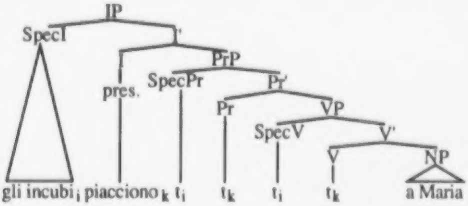
35)



36) Gianni teme gli incubi.
Gianni fears nightmares

Class 3 verbs assign an experiencer θ-role to their complement (indirect object position), which receives structural dative (but see footnote 5), and a theme θ-role to SpecV. While this position normally should acquire structural accusative, since this is an ergative verb, the argument in SpecV must nevertheless raise to SpecI to acquire nominative case to avoid a violation of the principle which underlies Burzio's generalization.[4] The S-structure representation of example (37), which involves a verb of class 3, is as in example (38).

37)



38) Gli incubi piacciono a Maria
nightmares please to Maria

## 3.2. Class 2 Psych Verbs.

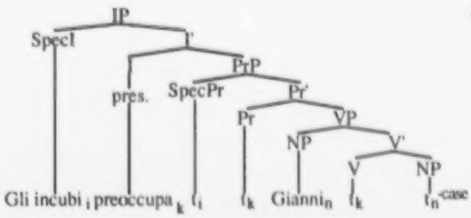
The class 2 verbs, however, will not represent as simple a case as classes 1 and 3. Their lexical representation must make possible an account of the constructions in which the class 2 verbs pattern like class 1 and transitive verbs and for those in which they don't. The lexical representation in (39) is posited as the general template for the class 2 verbs:

39) Class 2: $[[[\ \underset{\text{-case}}{\theta_3}\ ]\ \ \ ]\ \theta_1\ ]$ $\theta_1$ = stimulus[5], $\theta_3$ = experiencer.

There are two aspects of the representation in (39) that bear discussion. First, the class 2 verbs are similar to unergative verbs with respect to the positions in which their θ-roles are saturated (cf. (4) and (27)). Second, this representation includes the specification that the argument which is saturated in complement position not receive case in that position; this argument, therefore, will be forced to move to a case position, SpecV, in order to satisfy the case filter. This stipulation is similar to a stipulation of lexical case, by which an NP must exhibit some lexically specified case regardless of the structural case it would otherwise receive. It is this specification that insures that the class 2 verbs will act in certain respects like an unergative, in others like a transitive, and in yet others like neither of these two.

Now it is possible to see how sentences containing verbs of class 2 would be represented. The tree in (40) is an S-structure representation of the sentence in (41), which involves a verb of class 2.

40)


IP
SpecI
I'
PrP
pres.
SpecPr
Pr'
Pr
VP
NP
V'
V
NP
Gli incubi $_i$ preoccupa $_k$ $t_i$ $t_k$ Gianni$_n$ $t_k$ $t_n$$^{-case}$

41) Gli incubi preoccupano Gianni
nightmares worry Gianni

## 4. The Behavior of Italian Psych Verbs in Various Constructions.

In this section the syntactic phenomena noted in Section 1 above (auxiliary selection, passivization, causativization and the anaphoric clitic) will be discussed, and the behavior of class 2 verbs in these constructions will be shown to follow from the analysis given in the previous section.

### 4.1. Auxiliation.

As mentioned in section 1, the class 2 verbs pattern with class 1 verbs, transitives, and unergatives with respect to the auxiliary with which they appear in perfect forms; these verbs appear with *avere* 'to have' (A). All these verbs contrast with ergatives and class 3 verbs in that these latter types appear with *essere* 'to be' (E) as the perfective auxiliary. The analysis put forward in the last section makes a generalization concerning this arrangement of verb types quite simple. Transitives, unergatives, class 1 and class 2 verbs all assign an external θ-role, while ergatives and class 3 verbs all fail to do so.

We can therefore adopt a process of auxiliary selection which refers to this difference in the base-generated position of the arguments of verbs. Such a process is the one developed in Burzio (1986), which was specifically designed to differentiate the treatment of verbs which lack external arguments from the treatment of those which have external arguments. Burzio's rule is as in (42):

42) The auxiliary will be realized as *Essere* whenever a '*binding relation*' exists between the the subject and a 'nominal contiguous to the verb'. (Burzio (1986))

Bowers (1990) points out that we can understand this 'binding relation' as the relationship between NP-trace and its antecedent. A 'nominal contiguous to the verb' can be understood as an NP-trace in a VP-internal argument position. The patterns of auxiliation exemplified in (4-9) follow directly from this characterization. That is, in all cases where movement results in a A-chain relationship between SpecI and a VP-internal argument position, for example in unaccusative movement, the auxiliary will be E. In other cases, where movement doesn't result in such a relation, for example, with transitives and unergatives, the auxiliary will be A.

Now, the behavior of the three classes of psych verbs is not surprising given their characterization above and Burzio's treatment of auxiliation. The class 1 and class 2 psych verbs share, with transitive and unergative verbs, the property of having an external argument, and such an external argument results in an NP-trace relationship between SpecI and an argument position outside of VP. We correctly predict that A is the auxiliary in such cases. Class 3 verbs are ergative, and are thus correctly predicted to occur with E.

In previous analyses of the verb types under consideration here, for example in Belletti and Rizzi (1988), mechanisms other than (42) were adopted in order to account for data such as (4-9) in Section 1. Belletti and Rizzi (1988) propose that it is the ability of a verb to assign accusative case, either structurally or inherently, that underlies the selection of A. Since they propose that class 2 verbs are ergatives which lexically mark one argument with accusative case, they correctly predict that class 2 verbs will appear with A. This account is not empirically adequate, however, as example (4), repeated below, indicates.

4) Mario ha parlato a Gianni.
M. has-A spoken to Gianni
'Mario spoke to Gianni.'

The verb *parlare* 'to speak' in (4) fails to assign any accusative case, either structurally or inherently, and nevertheless the auxiliary is A.

This type of analysis also fails in another way. As examples (43) and (44), below, demonstrate, accusative case can be assigned, and the auxiliary can still be E. it is clear that an analysis of auxiliation in which the ability of a verb to assign accusative case is central will necessarily fail with respect to examples (4, 43,44).

43) Gianni si è comprato una machina
Gianni himself is-E bought a car
'Gianni bought himself a car

44) Gianni se l'è comprata
Gianni himself it$_{\text{acc}}$, is-E bought
'Gianni bought it for himself.'

For Burzio's account of auxiliation to work for (43-44) we must assume, in the spirit of Burzio himself and of some recent work by Kayne (1990), that the S-structure subjects of (43-44) are underlyingly internal arguments which raise to subject position, in this case from indirect object position. The external arguments of these sentences are realized in some 'non-standard' way, for example according to either Cinque's (1988) argument 'si' approach or Kayne's (1990) controlled PRO account.

### 4.2. Passivization.

As pointed out above, participles of transitive and class 1 verbs can appear with the passive auxiliary *venire* 'to come' (examples 10 and 11). Class 2 verbs cannot (example (12)). This data is consistent with the analysis proposed above for class 1 and class 2 verbs. In (11) the class 1 verb is a transitive verb, and undergoes passivization normally. In (12) the class 2 verb is unergative in nature, and unergatives in general do not passivize in Italian, as shown in (45).

45) *Gianni viene parlato (a) (da Maria). (unergative)
Gianni comes spoken (to) (by Maria)
'Gianni is spoken (to) (by Maria).'

The question now becomes why class 2 verbs should be able to form what Belletti and Rizzi demonstrate to be adjectival passives, as in (46), whereas other unergatives can't.

46) Gianni è preoccupato dalla tempesta
Gianni is-E worried by the storm

A hypothesis about the ability to form adjectival passives can be formulated along the following lines, assuming that passive raising and raising in general are constrained by properties of the verbs or auxiliaries in whose environment they occur. Assume that *venire* 'to come' as an auxiliary has the property that it can occur only with transitive verbs, but that E will allow any NP which is the specifier of its complement to raise past it.

Thus in (12) *venire* is impossible as an auxiliary since *preoccupare* 'to worry', a class 2 verb, is not transitive in nature. That is, the argument 'Gianni', base-generated in complement position and rendered caseless even in SpecV by passivization, can't raise past venire into the only remaining case position, SpecI, since it was not base-generated as the direct object in SpecV. In (11) there is no such problem, since *temere* 'to fear', a class 1 verb, is transitive in nature.

(46) is permitted by the looser requirements of the auxiliary E. Even an argument which raises into SpecV can continue to raise past E, as occurs with class 2 verbs and raising verbs such as *sembrare* 'to seem', exemplified in (47) below. Since the internal argument of other unergatives doesn't raise from its base-generated position, E-passives of these 'normal unergatives' will be ruled out by the Extended Projection Principle.

47) Gianni è sembrato essere triste
Gianni is-E seemed to be sad

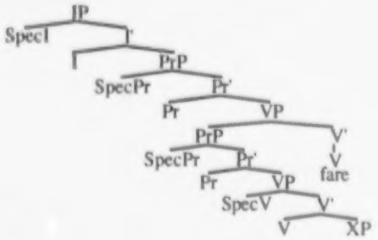
48) *Gianni viene sembrato essere triste
Gianni comes seemed to be sad

Note that this account of auxiliaries also neatly explains the contrast between (47) and (48). If E and *venire* were equivalent as auxiliaries, then we might predict that these two should be equally grammatical. The failure of *sembrare* 'to seem' to occur with *venire* is captured by the hypothesis put forth here. Only E is available as an auxiliary for *sembrare* 'to seem' since it is not a transitive verb, and *venire* must have a transitive complement. What remains to be specified elsewhere is the properties of the auxiliaries which underlie their behavior (see, for example, Toman (1986) and the works cited there).

### 4.3. Causativization.

Recall that in section one it was noted that, in causative constructions, arguments which in other contexts are realized as nominative subjects are able to appear in a given case (accusative or dative) if and only if there is no other argument of that infinitive which also appears in that case. We can formalize this observation in the following way. Assume that the structure of causatives in Italian is as in (49) and that the rule (or lexical relation) in (50) exists. (50) is constructed in the spirit of Larson's (1988) 'demotion to adjunct.'[6]

49)



50) Demotion to argument:
An external θ-role of a verbal argument of a causative may be saturated by an argument in an internal argument position, provided that no other θ-role is already saturated in that position. e.g. $[[[\ ]\ ]\theta_1] \rightarrow [[[\ ]\theta_1]\ ]$
but $^*[[[\ ]\theta_2]\theta_1] \rightarrow [[[\ ]\theta_1]\ ]$

The data above fall out directly from (49) and (50). Thus, the external θ-role of a transitive verb, can be saturated by an argument in complement position (with dative case) but not by one in SpecV (with accusative case) since there is already an argument (*le carte* 'the cards') which saturates its own θ-role there (see ex. (13)). The external θ-role of an unergative verb can be saturated by an NP in SpecV (with accusative case), but it can't be saturated in the sister of V position since there is already a θ-role saturated there (as in (14)).

The prediction made by the analysis here is that class 1 psych verbs should behave exactly like transitives, and this prediction proves correct in (15). The behavior of the class 2 psych verbs in this construction also follows from their characterization. In (16) the external theta-role of *preoccupare* 'to worry' has been saturated by an argument in complement position, but if this is so, then there is no way for the accusative argument to saturate its θ-role, which is also linked to complement position. That is, the structure for (16) must have two elements in the complement position of V, the trace of the accusative argument and the dative phrase 'a Mario', and this is the source of the ungrammaticality.

### 4.4. Binding of the anaphoric clitic 'si' and its interaction with inchoativity.

Consider the similarities in examples (51-54):

51) Gianni si preoccupa della situazione politica. (class 2)
Gianni himself worries about the political situation
'Gianni is/gets worried about the political situation'
52) Gianni si stanca.
Gianni himself tires
'Gianni gets tired.'
53) Gianni si ubriaca.
Gianni himself intoxicates
'Gianni gets drunk.'
54) John hurt himself. (in the non-agentive sense) (example from Bowers (1990))

Psych verbs of class 2 pattern with the class of transitive verbs in Italian and English exemplified by (52-54). (55) confirms that the Italian verbs behave like transitives with respect to passivization (unlike the class 2 verbs discussed above).

55) a. Gianni viene stancato dalla corsa a scuola.
Gianni comes tired by the race to school
'Gianni is tired (out) by the race to school.'
b. Gianni viene ubriacato da questo vino.
Gianni comes intoxicated by this wine
'Gianni is intoxicated by this wine.'

Class 2 verbs and the verbs in (52-54) share the property of having external non-agentive arguments which are co-indexed with affected internal arguments. We can define 'inchoativity' as precisely this situation, as in (56).

56) Inchoativity is the co-indexation of a non-agentive external argument and a (non-focal) affected internal argument.[7]

Class 1 verbs and agentive transitives differ from class 2 verbs in the structure and content of their lexical representations. Agentive transitives, as in (19) above, can't meet the requirements for inchoativity in (56) since they have agentive subjects. Class 1 verbs, as in (20) above, can't meet these requirements since they have unaffected internal arguments. Of these three verb types, only class 2 verbs (in addition to some non-agentive transitives) meet the requirements for inchoativity.

This analysis makes possible a single characterization for inchoative and non-inchoative uses of verbs like the class 2 verbs or 'hurt' in English. Significantly, this unification is possible within the account of psych verbs given here, whereas in approaches such as Belletti and Rizzi's a relationship between the two possible uses of such verbs is explicitly denied.[8] Since this unification seems to be a felicitous one, the approach given here is preferable to the other type of approach.

## 5. Intermediate Summary.

It has been shown that the behavior of Italian psych verbs in interaction with various syntactic process can be explained by positing that the three classes have the lexical representations in (33), (39), and (34), repeated below:

33) Class 1: $[[[\ ]\theta_2]\theta_1]$ $\theta_1$ = experiencer, $\theta_2$ = theme.

39) Class 2: $[[[\underset{\text{-case}}{\underset{|}{\theta_3}}]\quad]\theta_1]$ $\theta_1$ = stimulus, $\theta_3$ = experiencer.

34) Class 3: $[[[\theta_3]\theta_2]]$ $\theta_2$ = theme, $\theta_3$ = experiencer.

These characterizations allow for an explanation of auxiliation that depends on an independently motivated relationship between argument positions that Burzio (1986) details, precluding the necessity of the complication inherent in Belletti and Rizzi's (1988) approach. In addition, these characterizations have made possible an explanation of why verbs of class 1, but not of classes 2 or 3, may undergo *venire* -passivization, based on independently motivated characterizations of the auxiliary system. These characterizations of the psych verb classes also make the correct predictions about their behavior in the causative construction. The characterization of class 2 psych verbs above defines them as a specific set of those verbs which will be interpreted as inchoative by a general algorithm in the appropriate circumstances, thereby removing the necessity, inherent in earlier approaches, for positing two lexical entries involved for inchoative/non-inchoative pairs of sentences.

## 6. The U(T)AH problem.

Psych verbs have been of great interest mostly because of the problems that they create for what Pesetsky (1990) calls the U(T)AH family of hypotheses. These hypotheses are designed to reduce the task of language acquisition by providing the child with an innate knowledge of the mapping between syntax and semantics. Consider the two versions of U(T)AH in (57) and (58):

57) Uniformity of Theta Assignment Hypothesis (M. Baker (1988))
Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-structure.

58) Universal Alignment Hypothesis (Perlmutter and Postal (1984))
There exist principles of UG which predict the initial relation [that is, θ-role] borne by each [argument] in a given clause from the meaning of the clause.

If we assume that the general outline of UTAH is as in Baker's stronger version, then we can simply claim that the experiencer of class 1 psych-verbs is distinct from the experiencer of class 2 and class 3 psych verbs. The distinction between these θ-roles is parallel to the distinction between the θ-roles saturated by the the object of class 1 verbs and the subject of class 2 verbs. Pesetsky (1990) gives evidence for making this latter distinction. This paper can be taken as evidence that the experiencers too behave differently in the syntax. It must be left to future research to give independent arguments for the semantic status of these arguments.

Note that both versions of U(T)AH in (57) and (58) make specific assumptions about semantic theory. Namely, they assume that θ-roles are the semantic units which act as the interface for syntax and semantics, and that these θ-roles are primitives. Nothing could be more unsupported. Levin and Rappaport (1988) note that the way in which the term 'θ-role' is used is often vague or ambiguous, and when specific ones are mentioned, it is often by fiat and not through some argumentation that one label and not some other is applied. In addition, many researchers (see Chierchia (1989b) and Jackendoff (1987), among others) have argued that θ-roles are derived notions, and as such, may derive from potentially unlimited diverse semantic structures. Thus it must be noted that no version of the U(T)AH family of hypotheses can be maintained without strongly motivated syntactic structures on the one hand, and independently motivated semantic structures on the other. As mentioned above, this paper can be taken as an instance of the former; the latter must be left to future research.

## Notes:

[*] For helpful discussions in the preparation of this paper, I would like to thank J. Bowers, W. Harbert, M. Montalbetti, D. Pesetsky, L. Rizzi, A. J. Toribio, and G. Webelhuth.

[1] I hesitate to call either a subject, since both of these nominals show certain of the properties normally associated with subjects. This issue will not be considered here. For an account of this phenomenon, see Harbert and Toribio (forthcoming), and references cited there.

[2] Bowers (personal communication) has suggested that structural dative in this position is probably a rather common cross-linguistic phenomenon, the unmarked case.

[3] Bowers notes that these CFCs must be carefully distinguished from 1 or 2-place property expressions (XP, where X is lexical, in his framework), in that a propostion can stand on its own as a "complete 'thought' or 'information unit,' as it is termed in Chierchia and Turner (1988)." See Bowers (1990, pg. 6) and the works cited there for a more complete discussion of these issues.

[4] The analysis in Harbert and Toribio (forthcoming) explains how the theme of class 3 verbs is able to show nominative case and to control subject agreement, while its dative-marked experiencer acts as a binder for the PRO subject of infinitival adjunct clauses, by showing how both of these arguments may (and must) receive nominative case from $I^0$. If their analysis is adopted, then the characterization in (34) must include a specification of lexical dative associated with the experiencer in addition to the structural dative that it gets by virtue of its position. Tree (37) would not necessarily be the S-structure representation of example (38). For further discussion of the particulars of this analysis, see Harbert and Toribio (forthcoming), and the references cited therein.

[5] This is a term adopted by Farrell (1989), though its actual instantiation is different in that paper. I adopt this name both because it seems more appropriate than the standard theme, and because I've reserved theme for another sort of θ-role. Pesetsky (1990) also posits that this θ-role is different than the standard theme, but he calls this one 'cause', rather than 'stimulus'. See that paper for some arguments that the θ-roles of the object of class 1 verbs and the subject of class 2 verbs must be distinguished.

[6] (Pg. 352) 'If $\alpha$ is a θ-role assigned by $X^1$, then $\alpha$ may be assigned (up to optionality) to an adjunct of $X^1$.

[7] This inchoativity does not occur with class 2 verbs or with the verbs in (55) and (56) when the non-clitic reflexive 'se stesso', which requires heavy stress, is used, as demonstrated in (i) and (ii):

i) (?)Ultimamente, Gianni preoccupa perfino se stesso. Belletti and Rizzi (1988, pg.297, ex. 14b')
Lately, G. worries even himself

ii) a. Ultimamente, Gianni stanca perfino se stesso.
Lately, G. tires even himself

b. Ultimamente, Gianni ubriaca perfino se stesso.
Lately, G. intoxicates even himself

Agentivity in the subject can somehow result due to the focus on the reflexive object. It is unclear why this should be so, but it is obvious that either of these two properties can block inchoativity in the proposition. For this reason, whatever definition we give to inchoativity must make reference in some way to both focus and agentivity.

[8] The claim that there are actually two different verbs involved is obviously both uninteresting and counter-intuitive. More specifically, Belletti and Rizzi's claim is that class 2 verbs admit two constructions, Theme V Experiencer and Experiencer VP with an inchoative sense. The question therefore is how these two constructions are related.

## References

Bach, E. (1979), 'Control in Montague Grammar' Linguistic Inquiry 10, 515-531.

Belletti, A. and L. Rizzi (1988), 'Psych-verbs and θ-theory,' Natural Language and Linguistic Theory 6, 291-352.

Bowers, J. (1990), 'The Syntax and Semantics of Predication', unpublished manuscript, Cornell University, Ithaca, NY.

Burzio, L. (1986), *Italian syntax* , Reidel, Dordrecht.

Chierchia, G. (1985), 'Formal Semantics and the Grammar of Predication' Linguistic Inquiry 16, 417-443.

Chierchia, G. (1989a), 'A Semantics for Unnaccusatives and its Syntactic Consequences', unpublished manuscript, Cornell University, Ithaca, NY.

Chierchia, G. (1989b), 'Structured Meanings, Thematic Roles and Control' in G. Chierchia, B. H. Partee, and R. Turner, eds. *Properties, Types, and Meaning, vol 2, Semantic Issues* , Dordrecht: Kluwer.

Chierchia, G. and R. Turner (1988), 'Semantics and Property Theory,' Linguistics and Philosophy 11, 261-302.

Chomsky, N. (1981), *Lectures on Government and Binding* Foris, Dordrecht.

Chomsky, N. (1986), *Knowledge of Language: Its Nature, Origin, and Use* , Preager, New York.

Cinque, G.(1988), 'On *Si* Constructions and the Theory of *Arb* ' Linguistic Inquiry 19, 521-581.

Dowty, D. (1978), 'Governed Transformations as Lexical Rules in a Montague Grammar,' Linguistic Inquiry 9, 393-426.

Dowty, D. (1982), 'Grammatical Relations and Montague Grammar,' in P. Jacobson and G. K. Pullum, eds., *The Nature of Syntactic Representation* , Reidel, Dordrecht.

Farrell, P. (1989), 'Psych-Movement as P Incorporation: Evidence from Italian', paper presented at NELS 20, U. of Pittsburgh, Nov., 1989.

Franco, J. (1990), 'Towards a Typology of Psych Verbs: Evidence from Spanish' unpublished manuscript, University of Southern California.

Grimshaw, J. (1989), 'Argument Structure', unpublished manuscript, Brandeis University.

Harbert, W. and A. J. Toribio (forthcoming), 'Nominative Objects' in *Cornell Working Papers in Linguistics* 9, Cornell University, Ithaca, New York.

Jackendoff, R. (1987) 'The Status of Thematic Relations in Linguistic Theory', Linguistic Inquiry 18, 369-411

Koopman, H. and D. Sportiche (1988) 'Subjects,' unpublished manuscript, University of California, Los Angeles, California.

Kayne, R. (1990) Class notes, "Romance Syntax", Girona International Summer School, Summer, 1990, Girona, Spain.

Larson, R. (1988), 'On the Double Object Construction,' Linguistic Inquiry 19, 335-391.

Pesetsky, D. (1990) 'Experiencer Predicates and Universal Alignment Principles', unpublished manuscript, MIT.

Pollock, J.-Y. (1989) 'Verb Movement, Universal Grammar, and the Structure of IP,' Linguistic Inquiry 20, 365-424.

Levin, B. and M. Rappaport (1989) 'What to do with θ-roles' in W. Wilkins (ed) *Syntax and Semantics 21: Thematic Relations,* Academic Press, San Diego.

Stowell T. (1981), *Origins of Phrase Structure* Doctoral dissertation, MIT.

Toman, J. (1986), 'A (Word-) Syntax for Participles.' Linguistishe Berichte 105, pg. 367-408

Williams, E. (1975), 'Small Clauses in English', in J. Kimball, ed., *Syntax and Semantics* vol. 4, Academic Press, San Diego.

ESCOL '90 240-248

# THEMATIC ROLES AND FRENCH DATIVE CLITICS: *LUI* VS. *Y**

Hilary Sachs
University of Tennessee, Knoxville

## 0. Introduction

In this paper we look at that class of French verbs which allow preverbal cliticization of the dative clitic *lui*, but disallow cliticization of the dative clitic *y*, and propose a thematic role characterization of this class. We claim that *y* will be used for dative arguments assigned Theme, and that *lui* will be used for dative arguments assigned Recipient, Goal, and Source. We also claim that each clitic covers a specific segment of the Thematic Role Hierarchy (Kiparsky 1989). We will restrict our attention here to verbs allowing the preverbal clitic *lui*[1], which we will refer to loosely as "Agentive" verbs, since they are characterized very generally by subjects that have the thematic role of Agent or Source (this, as well as the arguments for this Thematic Role Hierarchy, is described in more detail in Sachs 1989[2]).

The Thematic Role Hierarchy we assume follows, in (1):

(1) **Thematic Role Hierarchy**
[Agent <Source < Cause < Goal /Exp /Ben /Rec < Theme < Loc <Verb>>>>>>]

Where Agent is the highest role on the hierarchy, and Locative the lowest[3]. We shall return to the hierarchy later.

## 1.0 *Lui* vs. *Y*

In both traditional grammars and in theoretical descriptions, the French dative clitics *lui*[4] and *y* are described as being distinguished by animacy (e.g. Gross (1968), Grevisse (1969), Blanche-Benveniste (1975[5])): *lui* is [+animate] and *y* is [-animate]. In example (2) *lui* is the only clitic allowed to replace the [+animate] Indirect Object *à sa maman*, and in example (3), *y* must be used to replace the [-animate] Indirect Object *la question*:

(2)
a. Elle répond à sa maman
She responds to her mama
b. Elle lui/*y répond
She to-her responds

(3)
a. Elle répond à la question
She responds to the question
b. Elle y/*lui répond
She to-it responds

However, animacy cannot be the only factor governing the selection of *lui* and *y*. For example, in (4), the verb *parler* 'to speak' does not allow *y* , and furthermore accepts *lui*, even when the Indirect Object (IO) is clearly [-animate]:

(4)
a. Le fou parlait au mur
The crazyman was-speaking to-the wall

b. Le fou lui/*y parlait
The crazyman to-it was-speaking

Even though Kayne (1975), Barnes (1980), and others have noted this problem, Kayne does not address it[6], and Barnes' Distinct Entity Constraint fails to predict the distribution of *y*. Barnes' constraint states that "the minimal semantic distinction between *lui* and *y* consists in the fact that *lui*, but not *y*, must refer to things as unitary entities; that is, the referent of the dative clitic [*lui*] must be a well-defined, distinct entity, *i.e.* an individual." (p. 270) Barnes' constraint may help to determine when *lui* can be used, but does not help us to understand the environments where *y* can and cannot be used. In (3), we see that *y* can be used to refer to a "well-defined, distinct entity" (*la question* 'the question'), but in (4), when we once again have a distinct entity, *y* is not possible.

Along with *parler* there are many other "Agentive" verbs which disallow the expected *y* and allow the unexpected *lui* when the referent is inanimate. A sampling of them is given in (5):

(5)
**"Agentive" verbs allowing *lui* (but not *y*) for inanimate objects**

| | | | |
|---|---|---|---|
| *acheter* | 'to buy' | *louer* | 'to rent' |
| *demander* | 'to ask (for)' | *montrer* | 'to show' |
| *dire* | 'to tell' | *offrir* | 'to offer' |
| *donner* | 'to give' | *parler* | 'to speak' |
| *emprunter* | 'to borrow' | *présenter* | 'to introduce' |
| *enlever* | 'to take' | *recommander* | 'to recommend' |
| *envoyer* | 'to send' | *rendre* | 'to return'; 'render' |
| *écrire* | 'to write' | *téléphoner* | 'to telephone' |
| *indiquer* | 'to indicate' | *vendre* | 'to sell' |

These verbs allow the clitic *y* **only** for Locative arguments, but never for Indirect Object arguments.

## 2.0 Thematic Structures

What all the verbs in (5) have in common, besides being "Agentive" verbs (that is, subjects that are assigned Agent or Source), is that the Indirect Object is assigned the thematic role of Goal, Recipient, or Source. Some representative thematic structures for these verbs are given in (6):

(6) Thematic structures

[Agent < **Source** < Theme < acheter >>>] (also: *emprunter*, *enlever*)

[Agent < **Recipient** < Theme < donner >>>] (also: *louer*, *présenter*, *offrir*, )

[Agent <**Goal** < Theme < écrire >>>] (also:*envoyer*, *demander*, *dire*, *indiquer*, *montrer*, *parler*, *recommander*, *téléphoner*)

[Source < **Recipient** < Theme < vendre >>>] (also: *vendre*)

Let us now look at the thematic structure of verbs that allow both *lui* and *y*, such as *répondre* 'to respond' and *obéir* 'to obey'. We should note here that although the notion that *y* is used to replace inanimate IOs exists very strongly in studies of French syntax, and has been favored by grammarians for several hundred years (according to Pinchon (1972)), *répondre* and *obéir* are virtually the only verbs that fit this pattern, allowing *y*. The thematic structure shown in example (7) corresponds to the string in (2) (*Elle répond à sa maman*), where *lui* is allowed, and the IO is [+animate]. We see that the thematic role assigned to the IO *sa maman* is Goal:

(7)
[Agent < **Goal** < répondre >>]

The IO in example (2) *sa maman* is assigned the role Goal, as was the IO in verbs such as *écrire*, above, since Goal is defined as the endpoint of the action, for non-motion verbs.)[7] When we then look at the thematic role assignment for the string shown in example (3) (*Elle répond à la question*), however, we see that there is a major difference between (2) and (3). In (3), the IO is not only inanimate, but also bears a different thematic role: it is a Theme rather than a Goal. The thematic role structure is the following (example (8)):

(8)
[Agent < **Theme** < répondre >>]

We assign the role of Theme to this argument following Gruber's (1976) definition of Abstract Theme. Abstract Theme is supposed to generalize the notion of Theme of movement verbs to arguments of verbs expressing no movement. Examples of Themes that he gives in non-movement verbs are the objects associated with the verb 'to communicate' and 'to signal', that are sometimes unexpressed.[8]

Let us note here that the animacy or inanimacy of the IO is independent of its thematic role assignment. Obviously, an inanimate NP can be assigned a role other than Theme. (For example, in example (4b) for the verb *parler*, the NP *mur* 'wall' would be assigned the role of Goal.) But in the case of *répondre*, as opposed to the verb *parler*, there is an obvious difference between the animate and inanimate IOs, differences that we do not find with verbs like *parler* 'to speak' or *donner* 'to give'. We can see this in (9) where both [+animate] and [-animate] arguments can be simultaneously expressed for the verb *répondre*:

(9)
Elle a répondu à la question sur l'avortement au journaliste
She AUX responded to the question on abortion to-the journalist

It is not possible, however, to have two IO arguments for any of the verbs we listed above in (5):

(10)
*Elle a parlé à son frère à sa soeur
She AUX spoken to her brother to her sister

(11)
*Elle a offert des bouquins à la bibliothèque à sa soeur
She AUX offered some books to the library to her sister

Since we will assume that no two arguments of a predicate will have the same thematic role, following Chomsky (1981), Bresnan and Kanerva (1989), and others, the grammaticality of (9) shows that these two arguments must have different thematic role assignments.

Not only are the assignments different, but we also claim that it is not necessary for both arguments of these verbs to be expressed. More precisely, we claim that these verbs are verbs of variable polyadicity.[9] We claim that this is the case with verbs like *répondre* and *obéir*: that the number of expressed arguments is variable. Thus, the thematic structure of these verbs must reflect that there are optionally expressed arguments. We propose the following thematic structure for *répondre* and *obéir*:

(12) Thematic role assignments: *répondre* and *obéir*:

[Agent < (**Goal**) < (**Theme**) < répondre >>>] (also: *obéir*)

## 3.0 Cross-linguistic Evidence

There is also cross-linguistic evidence for positing these thematic roles for *répondre* and *obéir*. We find that there are languages that assign different cases to the NP corresponding to the IO of verbs like *répondre*, and the different case assignments depend exactly on the two kinds of objects that we have been discussing here. Finnish, for example, assigns allative case to the [+animate] IO and illative case to the [-animate] IO with the verb *vastata*, 'to respond'. In German, we get not a difference in case assignment, but a rather an NP with dative case for 'answer the policeman' vs. a PP with accusative case for 'answer the letter,' as we see in examples (13a-b):

(13) German *antworten*
a.
dem Polizisten antworten
the-dative police-dative to-answer
'answer the policeman'

(13)
b.
auf den Brief antworten
Prep the-accusative letter answer
'answer the letter'

Greek also distinguishes between responding to a question and responding to someone, with practically the same system as German: in the former case the verb takes an accusative object while in the latter case it takes a PP with the preposition 'to'.

(14)
Apandisa tin erotisi.
answered-1sg. the-acc. question-acc.
'I answered the question'

(15)
Apandisa stin Anna.
replied-1sg to-the-acc Anna-acc.
'I replied to Ann'

Further evidence for positing two different thematic roles comes from Donno Sɔ, a dialect of Dogon (Niger-Congo) spoken in Mali and Burkina Faso, where there are two morphologically distinct verbs that together correspond to *répondre*. The verb *yabulɛ* is used for responding to people, and the verb *saa* to things, as shown in examples (16) and (17):

(16) Dogon *yabulɛ*

indɔ mile wo-law yabuli
man-the I with badly reply-past-3sng
'the man answered me in a bad manner'

(17) Dogon *saa*

dei u mɔ̃ boy salu ?
father you POSS call reply-neg-past-2sg
'you didn't answer the call of your father?'

In other words, from looking at cross-linguistic evidence, we see that there are languages where the verb corresponding to *répondre* assigns different cases to [+/-animate] objects, or where there are two different verbs corresponding to the one verb in French. Obviously, the fact that these languages exist does not prove that we have the same situation in French, but it does indicate that such a split is possible in principle.

## 4.0 Evidence from French

The evidence we see in French itself, however, also leads us to this same conclusion. In French, two conjoined NPs must have the same thematic role. We see evidence for this in the following examples:

(18)
Suzanne parlait à Micheline et à Marie
Suzanne was-speaking to Micheline and to Marie

(19)
*Suzanne parlait à Micheline et à Londres
Suzanne was-speaking to Micheline and to London

In (18) where both *à Micheline* and *à Marie* are assigned the thematic role Goal, the sentence is acceptable. However, in (19), where *à Micheline*, a Goal, is conjoined with *à Londres*, which is a Locative, the sentence is unacceptable.

We should note that it is not the case that one cannot conjoin NPs that differ in animacy, since the following strings are perfectly acceptable:

(20)
Le fou parlait aux bâtiments et aux passants
The crazyman was-speaking to-the-pl buildings and to-the-pl passersby

(Where both NPs have the same thematic role, that of Goal.)

(21)
Elle a offert ses vieux bouquins à la bibliothèque et à sa soeur
She AUX offered her old books to the library and to her sister

(Where both NPs have the same thematic role, that of Recipient.)

When we look at verbs that allow the clitic *y*, like *répondre* and *obéir*, we see the following:

(22)
Elle a répondu à sa maman et à sa tante
She AUX responded to her mama and to her aunt

(23)
Elle a répondu à la question et à la lettre
She AUX responded to the question and to the letter

(24)
#Elle a répondu à la question et à sa maman
She AUX responded to the question and to her mama

In (22), which is acceptable, we see that the conjoined NPs are both [+animate], and also are assigned the thematic role of Goal. In (23), the two conjoined NPs are [-animate] and are both assigned the thematic role of Theme. Again, both are acceptable. In (24), however, where there are two conjoined NPs with different thematic roles, the sentence is semantically unacceptable. As we noted above, it cannot be the case that conjoined NPs must match in animacy, so the difference must be in their thematic role assignment.

When we look at another verb that, like *répondre*, allows *y* for IOs, we see the same pattern, regarding conjoined IOs:

(25)
Elle a obéi au policier et à sa maman
She AUX obeyed to-the police-officer and to her mama

(26)
Elle a obéi aux règles et aux lois
She AUX obeyed to-the rules and to-the laws

(27)
#Elle a obéi à la loi et à sa maman
She AUX obeyed to the law and to her mama

Examples (25) and (26) show conjoined objects that are both assigned the same thematic role, that is, in (25) both IOs are assigned Goal, and in (26) both are Themes, and are acceptable. In (27), where one IO is assigned Theme (*la loi*) and the other Goal (*sa maman*), the sentence is awkward, at best.

## 5.0 Cliticization

Let us now look at cliticization. Our claim is that IOs of "Agentive" verbs cliticize to *y* only when they have the thematic role of Theme. Thus in (2b) and (3b) the difference in cliticization is due to the different thematic role assignments for the IO arguments. In (3), *y* is allowed precisely because the IO is assigned the role of Theme.

This claim correlates with other thematic role and cliticization facts in French. In colloquial French, for example, Direct Objects (DO), which usually have been assigned the role of Theme, can cliticize to *y* (which is usually thought of as the Locative clitic), instead of the standard DO clitics[10]. We see the standard cliticization in (28), and the popular use in (29):

(28) Standard French
Il faut la tuer
It is-necessary it-fem to-kill
'It's necessary to kill it' (e.g. *la bête*, 'the insect')

(29) Colloquial French
Il faut y tuer
It is-necessary *y* to-kill
'It's necessary to kill it' (e.g. *la bête*, 'the insect')

If we now look back at the Thematic Role Hierarchy that we introduced in (1), we see that neither the use of *y* instead of the standard DO clitic, nor the *lui* vs. *y* distribution among "Agentive" verbs is random, but rather that the selection closely follows the structure of the hierarchy. Looking at the hierarchy, we note that the lowest role on it is that of Locative, with Theme just above it, and these are the only two roles that allow the clitic *y* for Agentive verbs. *Lui* is the clitic allowed for arguments with thematic roles that are higher on the hierarchy. Kiparsky's (1989) claim is that the lower the role is on the hierarchy, the closer and more directly related it is to the verb, and we also will claim that the lower the role is, the more regular the cliticization of the argument it is assigned to. In fact, Locative cliticization is the most common and most regular in French; there are no exceptions to Locative cliticization. DO cliticization is next in regularity (and as we have noted, arguments assigned the thematic role of Theme most often appear as DOs).

## 6.0 Conclusion

To conclude, we claim that animacy alone cannot determine the placement of French dative clitics. Animacy is but an epiphenomenon; there is an apparent sensitivity to animacy, but the sensitivity is really to thematic roles. Our claim is that for French Agentive verbs, *y* can only be used for NPs that are assigned Locative or Theme, that is, the lowest thematic roles on the hierarchy. *Lui* can only be used for thematic roles higher than Theme. Thus we also claim that each clitic covers a specific continuous segment of the Thematic Role Hierarchy.

FOOTNOTES

[*] I would like to thank Cleo Condoravdi, Christopher Culy and Paul Kiparsky for their invaluable help, suggestions, and data, and Francis Bonahon, Alexandre Bronstein, and Odile Cazenave for their judgments.

[1] As opposed to verbs such as *penser* which do not allow preverbal cliticization of the dative clitic *lui*, but which require post-verbal cliticization.

[2] The *Lui*-cliticization generalization in Sachs (1989) states that "*Lui*-cliticization is allowed when the Logical Subject of the Verb is no lower than Source on the Thematic Hierarchy, or when the Logical Subject of the verb is demoted to Indirect Object." (p. 234)

[3] The abbreviations are as follows: Exp = Experiencer, Ben = Benefactor, Rec = Recipient, Loc = Locative.

[4] The dative clitics (aside from *y*) are distinguished by number and person, but not by gender. They are *me* (1sg), *te* (2sg), *lui* (3sg), *nous* (1pl), *vous* (2pl), *leur* (3pl). Since the first and second person clitics are identical in form to the DO and reflexive clitics, I will use *lui* to stand for the full set of dative clitics.

[5] Blanche-Benveniste (1975), in discussing verbs that allow *lui* notes that "les verbes comme *obéir* qui ont un *lui*, privilégient dans leur complément la personne animée par rapport à l'inanimé." 'Verbs like *obéir* which take *lui* favor the animate person over inanimacy in their complement.' [my translation] (p.40)

[6] Kayne (1975) is more interested in determining whether *y* is even a dative clitic. He suggests that *y* might be limited to nondatives and that verbs like *répondre* take both dative and nondative complements. He alternatively suggests that "one might decide to uniformly call *à* complements of ...*répondre* dative and allow *y* to replace datives in just such cases...." (p. 152)

[7] It could be alternatively argued that the IO *sa maman* should be assigned the thematic role of Source, since it is *maman* or maman's words that are indeed the Source of what needs to be responded to, but that argument does not affect our proposal.

[8] Gruber also refers to these as Informational Themes.

[9] Bresnan (1982) discusses the polyadicity of verbs, that is, verbs like English *read* or *eat*, that can occur with variable numbers of arguments.

[10] The standard Direct Object clitics are *le* (msg), *la* (fsg), *les* (pl).

REFERENCES

Barnes, B. (1980) "The Notion of 'Dative' in Linguistic Theory and the Grammar of French," *Lingvisticae Investigationes* 4, 245-292.

Blanche-Benveniste, C. (1975) *Recherches en vue d'une théorie de la grammaire française*, Librairie Honoré Champion, Paris.

Bresnan, J. (1982) "Polyadicity," in J. Bresnan, ed., *The Mental Representation of Grammatical Relations*, MIT Press, Cambridge.

Bresnan, J. and J. M. Kanerva (1989) "Locative Inversion in Chichewa: A Case Study in Factorization in Grammar," *Linguistic Inquiry* 20, 1-50.

Chomsky, N. (1981) *Lectures on Government and Binding*, Foris, Dordrecht.

Dunbar, R.T. (1981) *The Obligatory Use of the Preposition A Plus Disjunctive Pronoun After Certain Verbs in French* , Doctoral Dissertation, University of Illinois, Urbana, Illinois.

Grevisse, M. (1964) *Le Bon Usage*, Duculot, Gembloux.

Gross, M. (1968) *Grammaire transformationnelle du français*, Larousse, Paris.

Gruber, J. (1976) *Lexical Structures in Syntax and Semantics* , North-Holland Publishing, Amsterdam.

Jackendoff, R. (1972) *Semantic Interpretation in Generative Grammar*, MIT Press, Cambridge.

Jackendoff, R. (1987) "The Status of Thematic Relations in Linguistic Theory," *Linguistic Inquiry* 18, 369-411.

Kayne, R. (1975) *French Syntax: The Transformational Cycle* , MIT Press, Cambridge.

Kervran, M. (1982) *Dictionnaire Dogon Donno Sɔ: Région de Bandiagara*, Paroisse catholique, Bandiagara, Mali.

Kiparsky, P. (1989) "Agreement and Linking Theory," paper presented at the 1989 meeting of the Chicago Linguistic Society.

Pinchon, J. (1972) *Les pronoms adverbiaux EN et Y*, Droz, Genève.

Sachs, H. (1989) "French Indirect Object Cliticization and the Thematic Role Hierarchy," in K. de Jong and Y. No, eds., *Proceedings of the Sixth Annual Eastern States Conference on Linguistics*, OSU Press, Columbus.

ESCOL '90 249-259

# FOCUS AND THE DISCOURSE DIMENSION IN AUTOLEXICAL THEORY

Eric Schiller
Wayne State University & The University of Chicago

Within the framework of Autolexical theory (Sadock 1985, 1990; Schiller & Steinberg to appear) it has been recognized for some time that an explicit module for discourse phenomena is needed to account for such matters as topic/comment structure, extra-sentential anaphora, stylistic phenomena etc. In this paper I will argue that focus should also be dealt with along this dimension, which, in contrast to the original title of this paper, I now call the Discourse Dimension. As only a little work has been done on discourse representation in an Autolexical model, the proposal here is tentative in nature and designed primarily to provide a means for discussion of certain focus phenomena relevant to the present topic.

## The Discourse Dimension

The goal of an Autolexical analysis is to provide a complete model of all of the grammatical factors involved in a speech segment. Formalisms for the syntactic, morphological, semantic, and illocutionary dimensions have already been proposed, though each continues to evolve. Quite a number of grammatical aspects of language remain unexplored in this approach, including sentence types, topicalization, focus and discourse anaphora (including deixis). It will be recalled that the syntactic dimension does not represent the order of words as reflected in actual speech, but rather represents the constituent structure of the sentence.

Such traditional matters of syntax as "movement constructions", e.g. Raising, Topicalization, Passive, WH-movement, Inversion, Question formation etc. are not within the scope of the syntactic dimension in the present Autolexical framework. Rather than enrich the syntactic component with powerful devices, a more consistent Autolexical approach is to deal with matters of the surface order of constituents in a separate module. Among the benefits of this approach is that so-called "Free Word Order" or "Non-Configurational" languages can be represented in a dimension where non-syntactic factors which determine the surface word of a sentence can play a formal role.

To take an obvious example, Russian is a language where the factor of new vs. old information occupies center stage in the determination of word order. Even a simple question can be greatly influenced, as the following normal patterns show (1).

1) a. *čto* *delayet* *Ivan?*
what-acc do-PRS-3sg Ivan-nom
'What is Ivan doing?'
b. *čto* *on* *delayet?*
what-acc he-nom do-PRS-3sg
'What is he doing?'

In (1.a), the proper name appears last, the position in which new information is placed. In (1.b), on the other hand, the verb appears last because pronouns are obligatorily old information - a pronoun can (unless a deictic non-verbal gesture accompanies) only provide a limited amount of new information (person, number). Yet in order to take this into consideration in the syntactic component, we would have to make the claim that the information structure (new vs. old) is some sort of syntactic feature, an odd, if not absolutely unreasonable view. Clearly this, and other information-organizing factors such as topicalization and focus, deserve to be treated along another dimension entirely.

If we accept that in standard varieties of English, the initial position is the default position of focused elements, then it is possible to join together the analysis of seemingly heterogeneous phenomena of languages like English and Russian such as Question-formation, WH-movement, Passive, Clefting and possibly even imperatives using a single mechanism. The present paper contains little elaboration of these ideas, as such work must await another opportunity.

While it would be frivolous to attempt to demonstrate the superiority of an approach which is barely in its formative stages, some of the discussion below will compare the automodular approach with the enriched syntax approach of Kihm (1990).

## Focus

As discussed thoroughly in Bardovi-Harlig (1983), focus is among the most unfocused concepts in contemporary linguistics. She proposes a treatment of matters sometimes called focus using Prague School notions of Theme and Rheme. The introduction of these terms into our model would cause terminological chaos, since Theme is a term reserved for semantic case theory. But there is yet another problem with adopting Bardovi-Harlig's defintions wholesale - her treatment does not include interrogative pronouns as focus, whereas I join Kihm (1990) and Manfredi (1990:14) in noting the commonality of syntactic expression of focused elements and fronted WH. Thus my use of the term "focus" cannot be equated with her use of Theme. This places the burden of definition squarely on my shoulders. Her description of Theme and Rheme (1983:84) is given in (2):

2) a. *The theme is what the rest of the sentence is about; it is context dependent' it may be given information (evoked or inferred); it is probably definite (or generic); and it is likely to be in the subject position as that is the unmarked position of the theme.*

b. *The rheme is that part of the sentence which most advances communication. It is context independent; it is new information; it may be indefinite; and it is likely to occur near the end of the sentence. In addition, the rheme is likely to be expressed by a noun.*

All of the examples of what I call "focus" meet part of (2.a), in that the focus is certainly what the sentence is about (and I would include interrogative pronouns in this category.) In many languages, the material in focus is found at the beginning of an utterance. Of course, these two factors also apply to Topic, which is quite a different matter (as noted by Bardovi-Harlig). But focus bears a default relation to subject position whch topic does not, and focus also seems to be universal, while topic/comment stucture does not.

I take focus to be non-semantic in nature, yet do not go so far as Cinque (1983) in placing focus entirely in the non-grammatical realm of pragmatics. There are clearly grammatical consequences to placing something in focus. I will adopt the following as a working definition of the term:

3) *An item is in focus if the speaker's intent is to draw attention to the item.*

The grammatical reflexes of focus may take place on the Discourse Dimension, if word order is involved, or via explicit morpho-syntactic markers, or wherever intonation is to be localized. Focus should not be represented on the Semantic dimension, however, because neither truth-conditionality nor predicate-argument structure is involved. Of course, focus does effect presupposition (What John ate was a veggie-burger carries the presuppostion that John ate something.), and if one chooses to treat presupposition semantically rather than pragmatically an argument for inclusion in semantics might be made.

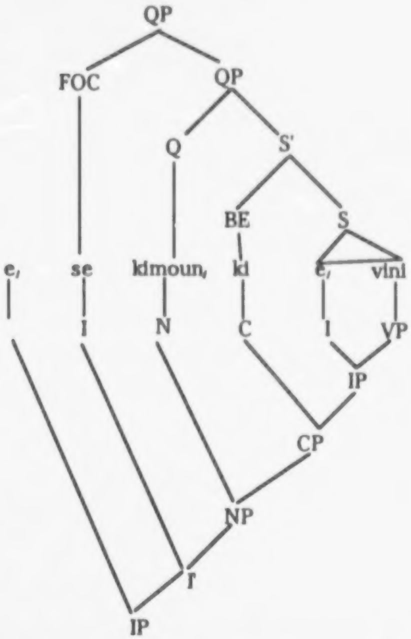
In some approaches to formal grammar, focus is handled within the syntactic component. In the Government and Binding framework, focus is differentiated from topic syntactically, with the former having noun phrases which are always coindexed with a null element in A-position, while in a topic construction the topic NP is not coindexed with a null element in A-position, but is coindexed with a pronominal or quasi-pronominal form (Bickerton 1990:8).

Within the most recent formulations of the Government and Binding framework, the general analysis (e.g. Oyelaran 1990, Kihm 1990) is that the focused elements move in to COMP.

Kihm (1990) proposes a focus analysis of WH-questions within the Government and Binding framework which is in many respects reminiscent of an Autolexical analysis. He analyses the following sentence (5) using two representations, one of an enriched semantics (LF) and one of surface syntax (PF), as shown in (4), represented in (5).

4) *se kimoun ki vini* (Haitian Creole)
it-be who that come
'Who came?'

5)



In this analysis, there are two operators in the Logical Form. The highest operator is a focus operator, which is "spelled out" as se (which also spells out the copula) in Haitian Creole. The second operator is a semantic marker of interrogativity. Focalization is obligatory in questions in Haitian Creole, under this analysis. The two halves of the tree do not represent automodules in the Autolexical sense, but are rather levels which are processed in parallel.

The notion of focus as a semantic operator is not uncommon. Placing it in the specifier position of QP (This is the derived structure, were it the ujnderlying structure, the second QP in the graph should probably be $\overline{Q}$, assuming that $\overline{X}$

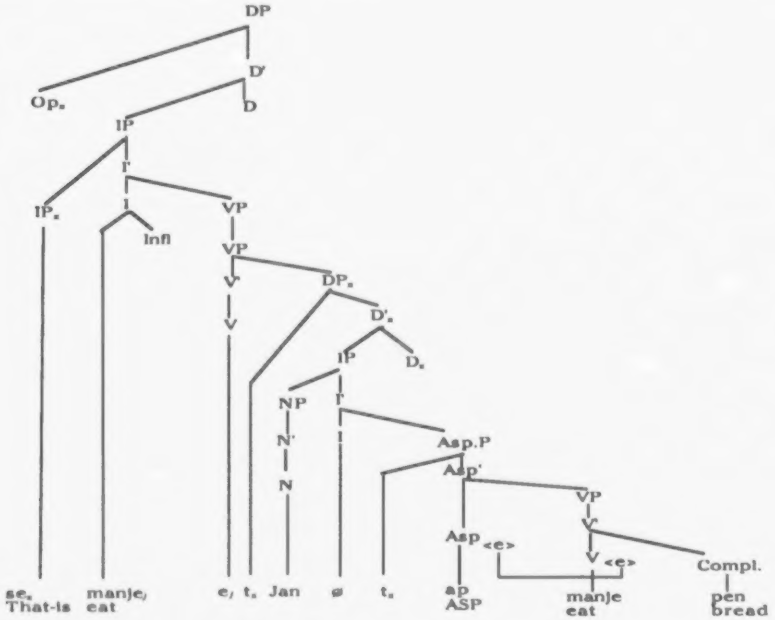
phrase structure is involved, since FOC is clearly not the head of QP) provides a link between focus and WH-questions. The entire semantic analysis seems to hearken back to the days of Generative Semantics and in particular the use of semantic operators for illocutionary force.

There are further problems with Kihm's analysis. The FOC operator does not immediately dominate the semantic entity which is in focus, but rather is a marker of focus. The marked item is not the sister of FOC, but is rather the head of the sister of FOC. Yet there is no reason why other semantic entities in that sister (QP) should not also be in focus, since the same structural relation (c-command) holds. Of course, one can always employ the invisible elevator known as LF-raising to get the scope right. Additionally, the fact that the focus marker is homophonous with the copula in all of the languages under consideration in Kihm's article remains unexplained.

Lefebvre (1990:124) provides a different structure within the GB framework:

| 6) | *se* | *manje* | *Jan* | *ap* | *manje* | *pen* | (Haitian Creole) |
|---|---|---|---|---|---|---|---|
| | be | eat | Jan | ASP | eat | bread | |
| | 'It is eating bread that Jan did.' | | | | | | |

7)



She claims that her analysis "accounts in a straightforward way for the interpretation of the clefted constituents. Whether the aspectual verb or the predicate or both are in the clefted phrase, focus interpretation bears on both the aspect and on its VP complement. In a clause containing an aspectual verb/marker, the event of the clause is defined by the conjunction of <e> of aspect and <e> of the predicator, through Theta-identification." This hardly seems straightforward. To begin with funny categories abound (se in IP, manje in Spec of I, and the clearly nominal pen in Compl.). The scope of the aspect is a semantic factor which is best handled autonomously, and the scope of the highest Operator once again should include everything it dominates, which provides no enlightening information concerning the focus.

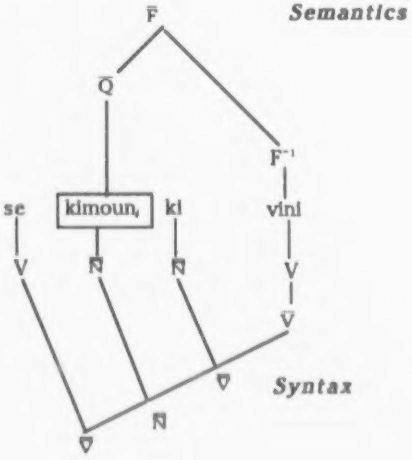
In the current model of Autolexical Syntax, Eilfort's (1989) Illocutionary Module (Dimension) would be a be a better location for the interrogative operator, while focus seems so tied to the surface syntax that it belongs in the Discourse Dimension, with the link between the two expressed by an automodular relation of the sort discussed in Eilfort & Schiller (1990).

For the representation of focus, I will adopt the convention of surrounding the item in focus with a box.

8) It is George Bush who will be found guilty of the destruction of the environment.

Kihm's example (5) might therefore be represented as in (9):

9)



This is, I believe, a much more natural representation than that provided by Kihm. The syntax here is quite normal, with the entire structure a sentential unit ($\overline{V} \rightarrow V \; \overline{N}$) differing from the English cleft construction only in that English requires a dummy subject. The complementizer, as is often the case in European (-based) languages, is nominal in morphological form and has the syntactic category $\overline{N}$ [___$\overline{V}$], abbreviated in the tree as $\overline{N}$, although COMP could also be used, though that designation is, in my opinion, less revealing, since the constituents headed by a complementizer show lots of NP behavior (McCawley 1988, inter alia.) The semantics are also straightforward - the entire utterance is a single proposition with one argument and one predicate. The illocutionary force comes from the Autolexical specification of kimoun as a WH-word, that is, as a word which has the following lexical entry (10):

10) kimoun 'who'
Morphology: $N^{-1}$
Syntax: $\overline{N}$ [___ $\overline{V}$]
Semantics: $\bar{Q}$
Illocution: +IP, -SR[1]
Constituent Order: +FOC

The constellation of lexical specifications is hardly unique to the Haitian Creole interrogative personal pronoun - it is the specification for such pronouns in many languages of the world, including, of course, English.

## Clefting and other focus-based extraction

It is possible to "extract" an argument from a serial verb construction and "front" it using a cleft construction with a marker. This phenomenon is discussed for Haitian Creole by Déchaine (1988), for Gullah by Mufwene (1990) and for Yoruba by Oyelaran (1990). Relevant examples from Haitian Creole are presented in (18)

18) a. *Se ki-sa<sub></sub> Jan pran t<sub></sub> bay Mariz* (Haitian Creole)
Foc. wh-thing Jan take give Mariz
'What did Jan give to Mariz?'

b. *Se lekol Jan ap mache ale*
It-is school John ASP walk go
'It is walking to school that John is doing.'
'It is walking TO SCHOOL that Joun is doing.' (not to the park)
'It is WALKING to school that John is doing.' (not run to school) (marginal)
*'It is WALKING TO SCHOOL that John is doing (not run to school) (marginal)

c. Se mache Jan mache al lekol
That-is walk John walk to school
'It is WALKING to school that John did.' (he did not run)
'It is WALKING TO SCHOOL that John did.' (he did not run to the park.)
'It is walking TO SCHOOL that John did.' (he did not walk to the park)

The first case involves simple extraction of an object of the first verb of a serial string, and can be accounted for straightforwardly using the mechanism described above. But in (18.b) we have an interesting set of interpretations, which somewhat vindicate the view proposed by Kihm (1990) and Lefebvre (1990) that the scope of focus can be anything in the sentence since everything is dominated by the proposed focal operator. Of course, that should apply to all constituents, and thus the question arises as to why the ungrammatical reading with the focus on WALKING TO SCHOOL should be ruled out. According to Lefebvre, it is ruled out because an operation of V' analysis is local, and when the direct object of one verb (presumably ale in this case) is undergoing clefting, the verb and the object are not adjacent and thus V' reanalysis is not licensed. The restraint is, therefore, cyclic in nature.

Of course, at surface structure there is no verb phrase to act as a constituent of focus, but more importantly, the reading where WALKING is the focus is indicated as marginal, and one can easily imagine why. Since Haitian allows Predicate Clefting, the normal way of placing a predicate in focus is to cleft it, and such a construction is available, as seen in (18.c). The interesting question is why (18.c) should be used with the last reading listed, which should be more felicitously rendered by (18.b). Unfortunately, since I have been unable to find informant who accepts 18.c, I cannot say anything more on the subject.

It has already been noted that the element used to mark focus in a cleft construction is homophonous with the copula in many languages. We find that in Southeast Asia this holds as well:

19) a. *Nwg siv tsaab tsag hlais khaub-cig* (Green Hmong)
s/he use CLF knife slice bread
'He cuts the bread with a knife.'

b. *Yog lub khaub-cig nwg siv tsaab tsag hlais*
be CLF bread s/he use CLF knife slice
'It was the bread that he cut with the knife.'

I would like to point out a parallel here which deserves further investigation. It seems, on the basis of the limited data to which I have access, that the copula, which is syntactically a verb, is preferred in just those languages which also use a verb (meaning 'say') as a complementizer, where languages such as English use (pro)nominal elements such as it and that. This is true not only of many Creoles, but also in the Southeast Asian examples, and even in those Tibeto-Burman languages which do not show subordinating serial ∇ constructions (Saxena 1988).

## The Interaction of Topic and Focus in Serial Verb Constructions

I would like to close with a brief remark on the interaction of focus and topic. As shown in Fauchois 1982 (cited in Manfredi 1990), focus and topic can coexist peacefully in the same sentence. By noting the relationship between the two, we can explain an interesting Saramaccan paradigm presented in Byrne & Caskey (1990:10 - traces omitted):

20) a. mi naki di dagu ku di pau di a bi tei kii di sindeki
I strike the dog with the stick the I Past take kill the snake
'I hit the dog with the stick that I killed the snake with.'
b. ku di pau di a bi tei kii di sindeki mi naki di dagu
with the stick R.P. he TNS take kill the snake I hit the dog
'I hit the dog WITH THE STICK with which he killed the snake.'
c. $^{?}$ku di pau di a bi tei kii di sindeki mi naki di dagu ku en
with the stick R.P. he TNS take kill the snake I hit the dog with it
d. ku di pau di a bi tei kii di sindeki ku en mi naki di dagu
with the stick R.P. he TNS take kill the snake with it I hit the dog
'I hit the dog WITH THE STICK WITH WHICH HE KILLED THE SNAKE.'
e. $^{?}$di pau di a bi tei kii di sindeki mi naki di dagu ku en
the stick R.P. he TNS take kill the snake I hit the dog with it
f. di pau di a bi tei kii di sindeki ku en mi naki di dagu
the stick R.P. he TNS take kill the snake with it I hit the dog
'I hit the dog WITH THE STICK WITH WHICH HE KILLED THE SNAKE.'

What is particularly noteworthy here is the strangeness of examples (20.c) and (20.e). Notice that there are fully grammatical parallel constructions

(20.b), (20.d) and (20.f) . In the case of (20.a), nothing is topicalized or in focus. In (20.b), the instrumental prepositional phrase is in focus, by virtue of being extracted and fronted, while there is no recapitulation of the instrumental phrase (as would be predicted by Bickerton's (1990) observations cited above. Recapitulation is evident in (20.c), however, but there is a conflict in focus. The instrumental prepositional phrase is in focus in the first clause, but in the lower clause it is in non-focus position. In (20.d), the instrumental prepositional phrase is in focus, but it is also in focus in the lower clause. This makes sense, as there is only one stick, and either it is in focus, or it isn't. The mixture creates a situation which is of marginal grammaticality. The last pair is equally revealing. In (20.e) the object of the instrumental serial verb is in focus, but the prepositional entity containing the instrument is not in focus in the lower clause. Again this is an unacceptable situation, rectified in (20.f) where both the extracted object of the serial verb and the instrumental prepositional phrase are in focus position.

This phenomena, which we may call "Focus Harmony" by way of analogy with vowel harmony, is localized in the Discourse Dimension, since a harmony rule of this sort is not of the type we find in pure syntactic structure. One cannot make recourse to the semantic operators proposed in the Government and Binding framework (discussed above), since presumably the entity 'stick' is within the scope of the operator whether it is fronted or not.

Of course there is more going on here. Caskey & Byrne (1990:11) note that

> "What is striking about (d), though, is that ku has no direct link to the serial which in and of itself encodes the relation of instrumentality. By virtue of the syntax, ku would be more properly associated with the non-serial lower main clause, yet apparently for reasons linked to emphasis, ku is allowed to appear, foreshadowing the prepositional encoding of instrumentality which the main clause demands. Furthermore, since SA is not a stranding language, and, moreover, does not permit pied piping, emphasis can only be for emphatic discourse reasons in this and similar cases."

While a full investigation of this mystery awaits further data from Saramaccan, one can take note of the fact that the prepositional and serial instrumentals seem to have different emphatic consequences, which bring to mind the properties of an unusual Thai instrumental preposition discussed in Schiller (1989,1990) to which the reader is referred, as time constraints prohibit discussion here.

## References

Byrne, Francis. 1990. "Tense" Scope and Spreading in Serial Verb Constructions. The Ohio State University, Columbus OH (5/26-27/90)

Byrne, Francis, and Alexander F. Caskey. 1990. Focus, Emphasis and Pronominals in Saramaccan. University of Chicago (May 10-12, 1990)

Dechaine, Rose-Marie. 1987. Towards a typology of serial constructions in Haitian. In Niger-Congo Syntax and Semantics No. 1. Edited by V. Manfredi. 49-64.

Eilfort, William. 1988. An Illocutionary Module for Autolexical Syntax. Presented at the Workshop on Autolexical Syntax, University of Chicago (4/22/89).

Eilfort, William, and Eric Schiller. 1990. Pragmatics and Grammar: Cross-Modular Relations in Autolexical Theory. CLS 26 (1)

Kihm, Alain. 1990. What is it that you said? A study of obligatory focalization in two croles and beyond. University of Chicago (May 10-12, 1990)

Levebvre, Clair. 1990. On the interpretation of the predicate cleft. University of Chicago (May 10-12, 1990)

Manfredi, Victor. 1990. Moved vs. in situ 'Verb Focus' in Kwa. University of Chicago (May 10-12, 1990)

Mufwene, Salikoko. 1990. Scope of Negation and Focus in Gullah. University of Chicago (May 10-12, 1990)

Oyelaran, Olasope O. 1990. Anti-focus in Yoruba: Some implications for Creoles. University of Chicago (May 10-12, 1990)

Sadock, Jerrold M. 1985. Autolexical Syntax: A Proposal for the Treatment of Noun Incorporation and Similar Phenomena. NLLT 3 : 379-439.

Sadock, Jerrold M. 1990. Autolexical Syntax: A Theory of Parallel Grammatical Representations. Studies in Contemporary Linguistics. Chicago: University of Chicago Press.

Saxena, Anju. 1988. On Syntactic Convergence: The Case of the Verb 'Say' in Tibeto-Burman. BLS 14 : 364-374.

Schiller, Eric. 1990. An Autolexical Account of Subordinating Serial Verb Constructions. Ph.D., University of Chicago.

Schiller, Eric, and Elisa Steinberg. to appear. Autolexical Syntax: Ideas and Methods. Berlin: Mouton.

ESCOL '90 260-271

# THE ASPECTUAL CONTENT OF COMPOUND VERBS

MONA SINGH*
The University of Texas at Austin

## 1 INTRODUCTION

Carlota Smith (1990) has recently proposed a *two component theory* of aspect. I use this theory to analyze the aspectual content of the so-called *compound verbs*, a kind of verb constellation common in Indo-Aryan languages. The resulting analysis not only provides a natural account of the aspectual role of compound verbs but also explains some facts about the distribution of compound verbs that have puzzled theoreticians for long.

The two component theory distinguishes between *viewpoint* and *situation type*. According to this theory, each sentence incorporates both kinds of aspect. There are three kinds of viewpoint aspect, namely perfective, imperfective and neutral. The situation types can be classified as states and events as proposed by Vendler (1967). Non-stative events can be classified into two major categories: *telic* and *atelic*. Telic events have a natural endpoint while atelic events and can not end at any time. This classification helps distinguish between achievements and accomplishments on the one hand and activities on the other. In this paper I look at the interaction of the perfective aspect with the four situation types. The importance of this interaction is explained in the following sections. Examples are cited from Hindi,[1] though most of the claims will hold for many CV-rich Indo-Aryan languages.

## 2 COMPOUND VERBS

The term "Compound Verbs" is usually used to refer to constellations of verbs that have the form [Verb1 + Verb2], in which Verb2 loses its independent meaning to a large extent. Verb1 is referred to as the "main" verb or MV and Verb2 is referred to as the "Explicator" verb or EV; the entire constellation is a compound verb, or CV for short. Let us look at some examples to help distinguish between compound and simple verbs.

1. dekh-a
   see-PERF (a simple verb)

2. dekh li-ya
   see take(EV)-PERF (a compound verb)

EVs usually lose a part of their meaning in a compound verb construction. Thus the verb *lenaa* 'take', when used as an EV just means that the action described by the main verb was done for ones own benefit. Similarly, the verb *denaa* 'give', when used as an EV means that the action was done for someone else. Much of the research on compound verbs has focused on the relationship between the main verb and the explicator verb, and the various domains in which compound verb constellations are acceptable (e.g. Verma (1989)). These are the non-aspectual components of the meaning of EVs.

Here I concentrate on the aspectual content of these verbs. It was first recognized by Hacker (1961) that CVs have some aspectual content. An important theory in this context is that of Porizka's (1969), who claims that compound verbs are marked with respect to perfectivity and are developed from simple verbs to form a special category. Unfortunately, extant theories cannot explain the distinction between sentences 3 and 4 below where explicator verbs occur with a perfective aspect:

3. hamne kitaab paRhii
   we-ERG book read-PERF
   We read the book

4. hamne kitaab paRh lii
   we-ERG book read take-PERF
   We read the book entirely

Hook (1989) maintains that sentences like 4 that have a CV *emphasize* the perfective aspect, while the simple verb forms as in 3 are aspectually unspecified. This analysis is intuitively unacceptable since it implies that CVs are variants of simple verbs with no explicit function of their own. This analysis also contradicts the position taken by philosophers like Roman Jacobson (1957) who believe that a morphological category has a *basic* invariant meaning, and that all applications of the category are special cases of the general meaning. I hope to present the basic aspectual meaning of the category that is called the compound verb.

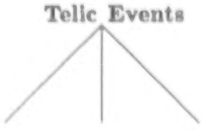
In §3, I propose an analysis of aspect as depicted by CVs. I look at the use of compound verbs in the four basic situation types. I provide evidence that CVs are related to situation types and not the viewpoint aspect.

## 3 TELIC EVENTS

There are two kinds of telic events, namely, *accomplishments* and *achievements*. The notion of completion is their major defining property. However, the two categories of telic events differ in their duration and complexity. Accomplishments (e.g. *build a house, walk to school*) are durative while achievements (e.g. *win a race, recognize someone*) are not. Telic events are distinguished from atelic events, which do not have a final endpoint (e.g. *walk in the park* is atelic since it does not have any associated natural final endpoint).

I submit that CVs are not related to viewpoint aspect. Perfectivity, I claim is not the cause of the presence or absence of compound verbs. Instead, CVs are markers of telicity. A telic event can be expressed as a complete whole only with a CV in the perfective viewpoint. In fact, all non-progressive achievements and accomplishments (i.e. telic events) have a CV constellation that focuses on one of the three potential points of focus described in Figure 1. However, as will be shown in §3, CVs do not occur in atelic events.

Different explicator verbs can be used to focus on different stages of a telic event. An exhaustive list of EVs focusing on the Final endpoint would be very long and an analysis of the choices available in the use of different EVs is beyond the scope of this paper.[2] This paper focuses only on their aspectual function. Several Hindi EVs and their points of focus are shown in Figure 1.[3]



| **Initial(I)** | **Final(F)** | **Result(R)** |
|---|---|---|
| lagnaa 'attach' | lenaa 'take' | cuknaa[4] |
| paRnaa 'lie' | denaa 'give' | |
| uThnaa 'rise' | baiThnaa 'sit' | |
| | janaa 'go' | |
| | aanaa 'come' | |
| | marnaa 'hit' | |
| | ⋮ | |

Figure 1: Explicator Verbs in Hindi

### 3.1 ACCOMPLISHMENTS

Accomplishments are heterogeneous, and consist of a process and an associated outcome. *Draw a circle, eat an apple* are examples of accomplishments. Since accomplishments have a natural endpoint, when the endpoint is reached the action cannot be continued as a part of the same situation type. Accomplishments may be described by the following *temporal schema* (Smith (1990)):

5. I . . . $F_N$ (R)

Here, I is the Initial endpoint of the event, $F_N$ its natural Final endpoint and R its Resultant state. Consider the following examples of accomplishments. In sentences 6 through 8 the CV forms are used in the perfective.

6. wo kal muurti banaane lagaa
   he yesterday statue make EV(I)-PERF
   He started making a statue yesterday

7. usne kal muurti banaa lii
   he-ERG yesterday statue make EV(F)-PERF
   He made a statue yesterday

8. wo kal muurti banaa cukaa
   he yesterday statue make EV(R)-PERF
   He was done making a statue yesterday (Some time has elapsed since the action was completed.)

As already pointed out, simple verbs cannot be used for achievements and accomplishments. However, the simple verb form, as used in sentence 9 does not imply that the action was completed. The event described is of the atelic category, activity, rather than of the telic category, accomplishment. In this particular example it means that the person referred to worked on the statue for sometime yesterday. The use of the perfective form merely signifies the cessation of that activity.

9. usne kal muurti banaaii
   he yesterday statue make-PERF
   He made a statue yesterday, for some time
   (He worked on the statue yesterday)

The event type associated with the act of making a picture is telic, but since the picture was not completed, the perfective form of a simple verb is used in sentence 10. Sentences 11, 12 and 13 have negated subordinate clauses; the main clause has the perfective form of a CV or simple verb construction. As seen in sentence 12 and 13, an EV(F) or an EV(R) is ungrammatical when used to indicate that a telic event was not completed. However, CVs focusing on the initial endpoint can be used in the main clause even if the action is said to be incomplete in the following clause.

As in example 11, the restriction is on EV(F) and EV(R). The progressive form of the simple verb as used in sentence 14 refers to the interval between I and $F_N$ in the temporal schema.

10. laRke-ne tasviir banaaii lekin nahĩĩ banii
    boy-ERG picture make-PERF but NEG become-PERF
    The boy made a picture but it wasn't made

11. laRkaa tasviir banaane lagaa lekin nahĩĩ banii
    boy picture make EV(I)-PERF but NEG become-PERF
    The boy started to make a picture but it wasn't made

12. * laRke-ne tasviir banaa dii lekin nahĩĩ banii
    boy-ERG picture make EV(F)-PERF but NEG become-PERF
    The boy made a picture but it wasn't made

13. * laRkaa tasviir banaa cukaa lekin nahĩĩ banii
    boy picture make EV(R)-PERF but NEG become-PERF
    The boy made a picture but it wasn't made

14. wo kal muurti banaa rahaa thaa
    he yesterday statue make PROG AUX-PAST
    He was making a statue yesterday

CVs cannot be used to refer to arbitrary endpoints. They are markers of Natural endpoints. The above examples indicate that the simple verb constellation, which is the default constellation for atelic events, when used in telic events implies that the endpoint is not the natural final endpoint, but instead the arbitrary endpoint.

The problem here is that the perfective viewpoint does not focus on the entire event. Rather it spans the interval from the Initial endpoint to a Final endpoint. The nature of the Final endpoint does not matter: it may either be the natural endpoint of an event or an arbitrary endpoint. The perfective viewpoint therefore has the following temporal schema:

15. / /
    I F

As discussed above, if the telic event terminates prior to reaching the natural final endpoint then the perfective form of a simple verb must be used. However, to refer to the telic event as a whole (from its initial endpoint to its natural final endpoint), an appropriate compound verb constellation is required. The temporal schema of accomplishments in Hindi must be redefined as follows (with $F_A$ the arbitrary endpoint):

16. $I \ldots F_A \ldots F_N$ (R)

This shows that although accomplishments are telic events and have a natural endpoint, they also have the properties of successive stages and duration. This is shown in sentence 14 above. The durative nature of accomplishments makes it possible to stop action towards an accomplishment without having reached the final endpoint. The SV-CV distinction is simply a mechanism of capturing this distinction.

It is interesting to note that though sentence 10 is acceptable in Hindi, it is self-contradictory when translated to English. This fact can be explained in the account presented here in a natural way. I have proposed that the perfective be associated with exactly one of two final endpoints—the arbitrary one and the natural one. Sentences such as 10 are acceptable because they can be given an interpretation in which the perfective main clause ranges from the initial endpoint to the arbitrary final endpoint. However, if an EV(F) is used in the main clause, it is forced to be interpreted as having spanned the interval up to the Natural final endpoint. In this case, exemplified by sentence 12, no non-contradictory interpretation is available.

The most frequently noticed property of CVs is that they do not occur in negative sentences; a simple verb must always be used there. No satisfactory explanations for this are currently available. However, viewing EVs as markers of telic situation types offers one. Since EVs are used to focus on an endpoint, the use of negation is not felicitous. Consider sentences 17 and 18 below. Both these sentences are negated accomplishments but only the simple verb constellation is acceptable.

17. * usne tasviir nahĩĩ banaa dii
she picture NEG make EV(F)-PERF
She did not make the picture

18. usne tasviir nahĩĩ banaaii
she picture NEG make-PERF
She did not make the picture

In using the negative with an accomplishment the speaker could mean that either

(i) She did not start making the picture, or

(j) She started making the picture but it was not completed.

Both (i) and (j) can be marked on the temporal schema of accomplishments as follows:

19. i . . . I . . . j . . . $F_N$ (R)

As mentioned earlier in this section, a CV construction can be used only when the point of reference coincides with one of I, $F_N$ or R. This is not the case in negated accomplishments since the points (i) and (j) lie before I and between I and F, respectively. In fact (j) corresponds to what I call $F_A$ and requires a simple verb constellation.

### 3.2 ACHIEVEMENTS

Achievements like accomplishments have a natural endpoint, but are instantaneous events that result in a change of state, e.g. *break, reach the top, recognize someone.* The temporal schema of achievements can be described as below.

20. (I) (. . .) F (R) . . .

As shown in the temporal schema above, there is only one obligatory endpoint in an achievement, and this point signifies the change from one state to another. The Final endpoint is the instant at which the achievement occurs. CVs are obligatory for achievements in perfective viewpoint. They must be used not only to focus on a particular point in the temporal schema, as in sentences 21 and 22, but also to refer to the event as a whole as in sentence 24.

21. wo res jiitne lagaa
    he race win EV(I)-PERF
    He started to win the race

22. wo res jiit cukaa
    he race win EV(R)-PERF
    He has won the race

23. usne res jiit lii
    he-ERG race win EV(F)-PERF
    He won the race

24. is laRke-ne is saal ki pratiyogita jiit lii
    this boy-ERG this year of competition win EV(F)-PERF
    This boy won this year's competition

Achievements are said to optionally include preliminary stages or the resultant stage. Hindi includes the resultant stage for all achievements. The progressive can also be used in achievements and indicates the progression towards the achievement of a goal, e.g. in sentence 25.

25. lagtaa hai wo use pahcaan rahii hai
seem AUX she her recognize PROG AUX
It seems that she is recognizing her

The crucial point about achievements is that, like for accomplishments, a CV is the only verb constellation possible to refer to them in the perfective. Though preliminary stages can be referred to in them, achievements are unique among situation types in that they are instantaneous. As a result the idea of an arbitrary endpoint does not agree with the distinguishing property of achievements. Thus in Hindi they are distinguished by not allowing the possibility of ceasing prior to the natural endpoint (as was possible in accomplishments by the means of simple verbs). Therefore in achievements *only* CVs can be used to refer to the various parts of the event or to refer to it as a whole in the perfective viewpoint.

As discussed earlier in §3.1, negative accomplishments cannot have a CV constellation. The same constraint holds for achievements. Consider the following examples:

26. * wo res nahĩĩ jiit gayii
she race NEG win EV(F)-PERF
She did not win the race

27. wo res nahĩĩ jiiti
she race NEG win-PERF
She did not win the race

Since achievements are instantaneous events a negated achievement would indicate that the point of reference as shown in the temporal schema in 28 below either

(u) Precedes I on the temporal schema, or

(v) Is between I and F on the temporal schema.

28. u (I) (...) v (...) F (R) ...

The point of reference on the temporal schema does not coincide with F in either case. Therefore, the CV form is not used.

## 4 DERIVED TELIC EVENTS

In the previous section, I discussed the relation between telic events and CVs. In this section I consider some more examples that will provide further insight into the function of CVs. Unlike telic events, atelic events and stative verbs may have CV constructions for some extended readings. The use of CVs in events with strictly atelic verbs introduces an endpoint and thus makes the events telic—I call these ***derived telic events.***

## 4.1 STATES

States consist of a single homogeneous period and lack stages (Comrie (1976)). The temporal schema provided by Smith (1990) for states is as follows:

29. (I) . . . (F)

States hold consistently for the time interval marked with the ellipsis. The initial endpoint denotes change into the state and the final endpoint denotes the change out of it. Since no endpoint is available for a state itself, CVs cannot be used in referring to them. States do not occur in the perfective form. States are always expressed by the neutral viewpoint, as in sentence 30 below.

30. wo lambaa hai
    he tall AUX
    He is tall

As a consequence of the interaction of CVs with states, the endpoints become visible; as a result of the event becoming telic they must be expressed in the perfective or progressive viewpoint.

The focus can be on the change into a particular state or a change out of a state. This distinction is captured by the use of EV(I) or EV(F). EV(R) can be used to imply a time gap following a change of state:

31. wo lambaa hone lagaa
    he tall to be EV(I)-PERF
    He started to become tall

32. wo lambaa ho gayaa
    he tall to be EV(F)-PERF
    He became tall

33. wo lambaa ho cukaa
    he tall to be EV(R)-PERF
    He became tall a while ago

The basic idea here is that an EV is introduced whenever an endpoint needs to be made visible. Since states do not have any endpoints in their temporal schema, the result is a point that signifies a change of state. That is, CVs with stative verbs indicate a change of state and are telic.

## 4.2 ACTIVITIES

Activities are processes that involve physical or mental activity. Unlike telic events, activities have only an arbitrary endpoint, i.e., they can be stopped at any time or may never end. The temporal schema of activities is given below (Smith (1990)).

34. $I \ldots F_A$

In Hindi, an EV(I) may be used to focus on the Initial endpoint of an activity; this is shown in sentence 35 below.

35. wo calne lagaa
    he walk EV(I)-PERF
    He started walking

Constellations of activities, like *walk* may have a quantized complement, thus allowing a CV as in sentence 36. Though the quantized complement does not obligatorily have to be present in the sentence, it is obligatory in the discourse. For example, sentence 37 and 38 are grammatical only when the distance walked or the destination is predetermined in the discourse.

36. wo ek ghante ke-liye cal liya
    he one hour for walk EV(F)-PERF
    He walked for an hour

37. wo cal liya
    He walk EV(F)-PERF
    He finished walking

38. wo cal cukaa
    he walk EV(R)-PERF
    He has finished walking (some time ago)

The discussion on telic events presented in this paper predicted that since atelic events like activities have an arbitrary endpoint, only simple verb constellations are possible in the activity reading. However, atelic verbs can have quantized complements that yield a telic situation type and thus require a CV constellation. The telic nature of the event is, of course, obligatory in the discourse. So a sentence like 37 is acceptable only if there is some information that the event of walking is a part of a telic event.

Activities can also occur in the progressive, making the internal stages visible, as in sentence 39 below.

39. wo cal rahaa thaa
    he walk PROG AUX-PST
    He was walking

## 5 CONCLUSION

All telic events require that a CV form be used, in the perfective viewpoint. Various kinds of CVs are possible that focus on different points of an event. Perfective CVs are different from perfective simple verbs in their aspectual content. Simple Verbs may be used to focus on the arbitrary final endpoints of accomplishments, whereas CVs focus on the natural endpoints. Achievements cannot have a simple verb construction, because they are instantaneous and cannot have arbitrary endpoints. The use of CVs with stative and atelic constellations results in inchoatives, ingressives and inceptives.

## FOOTNOTES

* I am indebted to Professors Manfred Krifka, Carlota Smith and Herman van Olphen for comments on an earlier draft of this paper, and to Professor Richard Lariviere, director of the Center of Asian Studies, for financial support.

1. Hindi is an Indo-European language, and is a direct descendent of Sanskrit. It has an SOV word-order with a highly complex verbal system. Each noun has grammatical gender, and verbs inflect for number, person and gender.

2. A number of papers in Verma (1989) are devoted to this topic.

3. Some authors (e.g. the list in Hook (1974)) have proposed that *rahnaa* be considered as an EV also. The approach of this paper can accommodate this easily: the figure below would have four branches instead of three, where the *rahnaa* branch would emphasize the internal stages of the event. However, *rahnaa* would then be an exception among EVs since it clearly cannot be used in the perfective.

4. Not all EVs can be used as independent verbs; e.g. the EVs *lagnaa*, *paRnaa* and *cuknaa* do not occur as independent verbs. The gloss given here for these verbs is an approximation at best.

## REFERENCES

Comrie, Bernard. 1976. *Aspect*. Cambridge University Press, Cambridge, UK.

Hacker, Paul. 1961. On the problem of a method for treating the compound and conjunct verb in Hindi. *Bulletin of the School of Oriental and African Studies*, 24:484–516.

Hook, Peter. 1974. *The Compound Verb in Hindi*. Number 1 in The Michigan Series in South and Southeast Asian Languages and Linguistics. University of Michigan Press, Ann Arbor, MI.

Hook, Peter. 1989. On the emergence of perfect aspect in Indo-Aryan. In Manindra Verma, ed., *11th South Asian Languages and Analysis Roundtable*, Madison, WI.

Jacobson, Roman. 1957. Shifters, verbal categories, and the Russian verb. In *Selected Writings of Roman Jacobson*, volume 2, Word and Language, pages 130–147. Mouton, The Hague.

Mittwoch, Anita. 1988. Aspects of English aspect: on the interaction of perfect, progressive and durational phrases. *Linguistics and Philosophy*, 11:203–254.

Mourelatos, Alex. 1978. Events, processes and states. *Linguistics and Philosophy*, 2:415–434.

Porizka, Vincec. 1969. On the perfective verbal aspect in Hindi (concluded). *Archiv Orientalni*, 37:345–364.

Smith, Carlota S. 1990. *The Parameter of Aspect*. Reidel - Kluwer. In press.

Vendler, Zeno. 1967. *Linguistics in Philosophy*. Cornell University Press, Ithaca, NY.

Verma, Manindra, ed. 1989. *11th South Asian Languages and Analysis Roundtable*, Madison, WI.

ESCOL '90 272-285

# THEMATIC STRUCTURE AND VERB PREFERENCES

Laurie A. Stowe
The Ohio State University

People clearly make use of lexical information, including syntactic category, subcategorization, thematic information and verb expectations or verb preferences at some point in language processing. This paper will focus on the use of verb preferences: the expectation of the hearer that a verb is likely to be used in a particular sort of structure, even when there are other possibilities. Although it is clear that these preferences are used in sentence processing, it is not particularly clear (1) how the information is used and (2) what kind of information it is that is used. This paper will address those two points.

It has been proposed that verb preferences are used by the parser to build the upcoming syntactic structure, that is, the preferred structure is projected by the parser (Ford, Bresnan and Kaplan, 1983). An alternative view is that the preference is used as a filter to confirm or reject a syntactic analysis that is constructed independently by the syntactic parser (Mitchell, 1987, 1989; Frazier, 1989). Both of these proposals assume that verb preference is syntactic in nature, perhaps a preference for a particular subcategorization frame. An alternative is that verb preference is for a particular semantic or thematic structure. Under this view of the nature of verb preference, it is natural to view the effect as a filter over the semantic interpretations of structural analyses independently constructed by the syntactic processor.

Evidence for the use of verb preferences comes from several different experimental paradigms. Ford, Bresnan and Kaplan (1983) collected judgments about the preferred interpretation of structurally ambiguous sentences. Changing only the verb caused a change in how frequently a given structural interpretation was preferred, as illustrated in (1).

(1) a. The women discussed the dogs on the beach.
"the dogs which were on the beach" 90%
"discussed them while on the beach" 10%
b. The women kept the dogs on the beach.
"the dogs which were on the beach" 5%
"kept them on the beach" 95%

This result indicates that one of the sources of information for choosing between alternative structures under ambiguity is associated with the verb. Unfortunately, since this task only taps a representation of the sentence in memory after the processing is complete, it does not indicate when verb information is used during processing, nor does the experimental manipulation address what kind of information is used.

Clifton, Frazier and Connine (1984) showed effects of transitivity preference in an on-line lexical decision task. The preferences were based on norms collected by Connine, et al (1984), who had people generate sentences containing specific verbs; verb preference was defined experimentally as the syntactic frame in which the verb was most frequently used. Clifton et al. constructed sentence sets in which transitive (e.g., read) and intransitive (e.g. sing) preference verbs were used in either their preferred or unpreferred form. They displayed a letter string at the corner of the screen, spatially separated from the sentence being parsed, at the word after the verb which indicates that the sentence is transitive (e.g., the) or intransitive (e.g., to). People had to judge whether the string was a word or not. The lexical decision was made more quickly when the word following the verb was congruent with its preferred structure.

This experiment shows that verb preference is available to the parser very quickly and that it affects the parsing even of unambiguous sentences. The speed of the effect might suggest that people use the verbal information to project the transitive or intransitive structure. Under this hypothesis, the presence of a word indicating that the actual structure is not the projected structure would lead to reanalysis. The effort of reanalyzing would prevent people from doing the lexical decision task as quickly as they would if the word had fit into the projected structure. However, it is also possible that the parser does not use verb preference to construct the structure ahead of time, but that as the structure that is necessary given the following word (e.g. the or to) is constructed, the verb preference is used to check if the structure is appropriate. In other words, it is also possible that a verb filter comes into play immediately, interfering with the lexical decision. It is impossible to decide between these two views of the role of verb preference, given these experimental results, although it is worth noting that for the verb filter view, an extremely quick use of the verb filter must be assumed.

Other studies by Clifton, Frazier, and Connine (1984), Tanenhaus, Stowe and Carlson (1985), Garnsey, Tanenhaus and Chapman (1987), and Stowe, Tanenhaus and Carlson (in press) show that transitivity preference is also involved in the interpretation of filler-gap constructions. A particularly clear result was obtained by Garnsey, Tanenhaus and Chapman (1987), who presented questions containing transitive or intransitive expectation verbs to subjects. The WH-phrase in the question was varied, so that in half of the sentences seen by each subject, it was a plausible object of the verb (e.g., read which book), while in others it was anomalous (e.g., read which food). Subjects' reactions were monitored using the evoked response potentials technique, in which electrodes are placed at selected sites on the scalp. A certain pattern of EEG activation has been identified as the response to the appearance of words that are implausible or anomalous in a sentential context, called the N400. This consists of a negative activation peaking at approximately 400 msec. after presentation of the anomalous item. This negative pattern of response was found at approximately 400 msec. after presentation of the verb in the implausible filler condition; there was no trend toward this negative pattern for the plausible fillers. Garnsey, Tanenhaus and Chapman argued that this pattern indicates that as soon as people see the verb, they assign the filler to the object position, the First Resort strategy for gap filling. The fact that the N400 shows up almost as soon as it does for an object in situ argues that people must assign the object role to the WH-phrase virtually as soon as the verb is recognized. The relevance of this experiment to the present paper is that the effect of anomaly was only present for transitive expectation verbs. Apparently the recognition of a transitive expectation verb is sufficient to lead to the identification of an object gap and the interpretation of the WH-phrase as the object. When an intransitive expectation verb is identified, however, the intransitive structure is apparently assumed, and people do not interpret either plausible or implausible WH-phrase as the object of the verb.

Tanenhaus and his colleagues (Carlson and Tanenhaus, 1988; Tanenhaus and Carlson, 1989; Boland, Tanenhaus, Carlson and Garnsey, ms.) have noted that it is not obvious from these results that the parser projects a syntactic structure with a gap in object position, indirectly leading to the assignment of the object semantic role to the WH-phrase. Another possibility is that the identification of a verb makes available certain semantic roles which can be assigned directly to the WH-phrase. Under this hypothesis, the transitive expectation verb creates the expectation that the object role will be filled and people assign it to the WH-phrase, while the intransitive expectation verb does not.

Other experimental work shows that verb subcategorization requirements and verb preferences are not used in the same way. Stowe and Holmes (ms.) compared sentences like those in (2) using a self-paced word-by-word grammaticality decision task, in which people push a YES or NO button to indicate whether each succeeding word fits into the sentence grammatically. The time from presentation until the button is pressed provides a measure of the difficulty of processing a word in a particular context.

(2) Although Mr. MacKenzie arrived his wife didn't seem to notice.
Although Mr. MacKenzie cheated his wife didn't seem to notice.
Although Mr. MacKenzie heard his wife didn't seem to notice.
Although Mr. MacKenzie arrived with his partner his wife didn't seem to notice.
Although Mr. MacKenzie cheated on his partner his wife didn't seem to notice.
Although Mr. MacKenzie heard his partner his wife didn't seem to notice.

These materials were constructed around the late closure phenomenon identified by Frazier (1978). When punctuation is removed between a subordinate clause and the following main clause, people tend to assume that the subordinate clause is not finished until they receive unambiguous evidence of closure. This effect allows us to identify the types of information that people can use to correctly determine the clause boundary. In the sentences shown in (2), people parse the locally ambiguous NP his wife as part of the subordinate clause, if possible. This leads to difficulty at the main clause verb phrase, since his wife turns out to be the subject of the main clause. The latter three sentences of the comparison include an intervening prepositional phrase which signals that the NP is unlikely to be the object of the subordinate clause verb. If reading times are longer in the main clause verb phrase for the short versions than the long versions, the clause boundary was not initially located correctly for these versions.

Stowe and Holmes tested to see if transitivity requirements and expectations can be used. They collected sentence completion norms for the verbs used in the experiment, in order to estimate verb preference. People apparently located the clause boundary correctly when the verb **cannot** be used transitively. The sentences where the subject NP immediately follows an intransitive verb (e.g., arrived his wife) are no harder at the main clause verb phrase than the control sentences with an intervening prepositional phrase (e.g., arrived with his partner his wife). However, they show significantly longer reading times in the main clause verb phrase when the subordinate clause verb can be used transitively (e.g., cheat and hear). The difference is smaller for the intransitive preference verbs (e.g., cheated) than the transitive preference verbs (e.g., heard), but is nevertheless significant.

There was also an effect of transitivity at the determiner. The time to read the determiner was significantly longer immediately following obligatorily intransitive verbs than optionally transitive verbs, while the time to read the determiner following the intervening prepositional phrase was significantly longer for the optionally transitive verbs than the obligatorily intransitive verbs. This suggests immediate use of subcategorization information. Interestingly, the pattern for intransitive preference verbs was the same as for transitive preference verbs rather than as for intransitive verbs. As with the experiments discussed earlier, it is not clear whether the immediacy of verb information use should be attributed to the projection of upcoming structure or to the effect of very quick use of a filter.

These results suggest that verb preferences are not strong enough to overcome syntactic evidence that a verb is in an unpreferred structure, since people misanalyzed the sentence for both transitive and intransitive expectation verbs. This is not a particularly surprising result, since people have to be able to parse sentences in which verbs occur in unpreferred, although grammatical, frames. The results also indicate that knowledge that a verb **cannot** occur in the apparent structure can be used to determine the correct boundary with little difficulty. This is particularly interesting given the artificiality of this ambiguity; subcategorization requirements must apparently be made use of routinely and consistently, or they would not easily be applied to such a situation. A third important point is that verb preference information remains available to the parser even after a local structure has been assigned, since it is clear that the preference is used to recover from the original misanalysis. By far the most important point for this paper, however, is that verb preferences do not behave in the same way as verb frame requirements. I will return to this point below.

## I. How Are Verb Preferences Used?

As pointed out at the beginning of the paper, one important question is whether verb preference effects reflect the use of verb information to **guide** the construction of upcoming structure, the Verb Guidance hypothesis, or the use of verb information to **check** independently constructed analyses, the Verb Filter hypothesis. Under the Verb Guidance theory, verb preference is used to project upcoming structure; the only analysis initially considered by the parser is that most congruent with the verb; when the actual sentence does not match this structure, processing is more difficult. Ford, Bresnan and Kaplan (1983) take this position. An alternative, proposed by Mitchell (1987, 1989) and Frazier (1989) is that lexical information acts to filter out analyses proposed serially independently of lexical preference by the parser. As we have seen the experiments above do not seem to choose clearly between these alternatives.

Mitchell (1987) argues strongly against the Verb Guidance hypothesis. He presents evidence that people ignore even verb requirements under certain conditions. If the parser does not use requirements to guide parsing, it certainly does not use preferences for this purpose. He manipulated presentation of late closure sentences like those illustrated in (2), using a self-paced phrase-by-phrase presentation, where people press a button as soon as they are done reading a phrase in order to obtain the next one. The sentences were either divided at the clause boundary (e.g., after the child sneezed / ..) or after the main clause subject noun phrase (e.g., after the child sneezed the doctor /...). When the ambiguous NP was included with the subordinate clause, people showed much longer reading times if the verb was obligatorily intransitive than when the verb was optionally transitive. Mitchell pointed out that this suggests that people do not use verb information to determine the clause boundary, thus providing evidence against the Verb Guidance hypothesis.

This evidence is far from conclusive. Verb information can determine that the verb phrase is finished, yes; it cannot guarantee the end of a clause and there is no reason to expect it to do so. In fact, NP-like objects can occur after an intransitive verb in a clause, as demonstrated in (3).

(3) Mr. MacKenzie arrived the other night.

Therefore it is possible that the long reading times in Mitchell's experiment are due to the subjects' attempt, due to the visual presentation, to interpret the NP as an adverbial, rather than as an object.

Despite this caveat about Mitchell's line of argument, on the whole there seems to be little reason to believe that the parser uses lexical subcategorization requirements, much less preference, to project upcoming structure. A recent set of experiments by Ferreira and Henderson (1990) addresses this point. Ferreira and Henderson compared the parsing of sentences like those in (4), using both eye-tracking and self-paced reading tasks. The patterns were generally similar, so I will discuss only the eye-tracking experiment.

(4) He wished that Pam needed a ride with him.
He wished Pam needed a ride with him.
He forgot that Pam needed a ride with him.
He forgot Pam needed a ride with him.

They found no difference in initial fixation times within the ambiguous region (e.g., Pam), but at the subordinate clause verb phrase, the complement clauses which were not marked by an overt complementizer showed longer fixation times than clauses with that. This difference appeared for both verbs like forget that can readily take a direct object and verbs like wish which normally do not. Their conclusion from this data is that the parser initially attempts to attach the noun phrase as direct object, without making reference to verb preference and must recover from this error for both types of verb. This conclusion is in line with the Verb Filter hypothesis, augmented by the assumption that a transitive structure is always assumed first by the serial parser. However, I will interpret the result somewhat more conservatively as indicating that the parser does not use the information that a complement clause is the most likely complement to verbs like wish to pursue that analysis until it is shown to be in error. If this procedure were followed, the presence or absence of the overt complementizer would make no difference. One reason for this more conservative conclusion is that under the garden path hypothesis advanced by Ferreira and Henderson, it is unexpected not to find some effect of verb type within the ambiguous region. The ambiguous NPs are unlikely, taken as direct objects of the complement preference verbs (e.g. wish Pam or hoped Jill). Therefore, longer reading times would be **predicted** under the minimal attachment hypothesis. I will discuss another hypothesis which fits these results below.

Both of the hypotheses considered up to this point assume that the parser proposes syntactic analyses in some serial order, either determined by lexical information or not. There are two alternatives, similar to the Verb Filter hypothesis in spirit, but assuming a different architecture for the parser. One alternative is that lexical information is one of several sorts of information used in choosing between alternative analyses proposed simultaneously by the syntactic processor, as in the incremental multiple analysis theory of Crain and Steedman (1985), Steedman (1989), Altmann and Steedman (1987), and Steedman and Altmann (1989). Another alternative is that the parser acts serially, but holds ambiguous material until receiving additional information to choose between the possible structures and checks relevant lexical and possibly semantic information to avoid constructing the wrong structure (Marcus, 1980). The latter type of model uses **Lookahead** to avoid misanalyses. Gorrell (1989), Cupples and Stowe (ms.) and MacDonald, Carpenter and Just (ms.) discuss experimental evidence that supports models like these. Both of these models assume that a choice is made among alternatives, and will be referred to as Choice models hereafter.

Holmes, Stowe and Cupples (1989) provide evidence supporting some version of the Choice models, in which lexical preference is used to make a choice among alternative hypotheses. They compared sentences like those in (5) using the self-paced word-by-word reading task in their Experiment 3. In this task, people press a button as soon as they have read the word on the screen in order to obtain the next. The time from presentation until they press the button provides a measure of the difficulty of processing a word in a particular context. Each word appeared in a position spatially following the preceding word, but only one word appeared on the screen at a time.

(5) The reporter saw the woman was looking nervous.
The reporter saw the woman who came in was looking nervous.
The reporter saw that the woman was looking nervous.
The reporter saw that the woman who came in was looking nervous.

In the initial two sentences of the set, the NP the woman is temporarily ambiguous; it may either be the object of the verb saw or the subject of a complement clause. In the latter two sentences, the complementizer that disambiguates the sentences. Two additional manipulations were done. The ambiguous phrase was short in some versions and long in others; and some sentence sets contained verbs like see which are normally used transitively, while others contained verbs like realize which normally are followed by a complement clause. The comparison of the ambiguous sentences with the unambiguous versions can tell us if people apparently treated them the same way. People consistently took more time to read the verb phrase (e.g., was looking nervous), in ambiguous sentences after verbs like see that prefer a noun phrase complement. This suggests that they initially treated the ambiguous phrase as a direct object. The pattern was more complex for sentences containing verbs like realize that expect a complement clause; there was no sign that people were surprised by the complement clause in the short versions, but for the long versions, people did show clear signs of surprise. This suggests that people take the ambiguous phrase as a direct object, but only if it is relatively long.

These results are hard to explain under the Verb Guidance hypothesis. That would predict that people always expect an object for verbs like see and always expect a complement for verbs like realize; there is no reason for length to cause them to change their minds. They are equally difficult for the Verb Filter hypothesis, assuming a serial parser that includes a non-lexical syntactic preference, as in Ferreira and Henderson's (1990) account. Their account predicts that the initial analysis should be the same for both types of verb, then the filter must apply early on to explain the results for the short versions, where both verb types are apparently interpreted in their favored form. This theory does not explain why a long ambiguous region should cause the analysis to change for a second time.

The pattern of results obtained by Holmes, Stowe and Cupples (1989) instead suggests that people immediately decide on the object analysis for sentences containing transitive preference verbs, but do not immediately opt for the complement analysis for complement preference verbs. When evidence quickly becomes available confirming the complement analysis, people take that analysis, but if there is no confirming evidence for the complement clause analysis within some short span, they decide on the direct object analysis. In fact, this evidence appears to be most compatible with a model in which people decide between alternative analyses; a decision can be delayed for a short period of time, but is made as soon as there seems to be sufficient evidence for one alternative or the other (see Stowe 1990 for additional evidence for this limited delay model of syntactic processing). An important point about this model is that lexical information contributes to the decision to delay, but does not determine the eventual decision in the case of this particular ambiguity.

The Ferreira and Henderson (1990) study described above appears to be compatible with the Choice models as well. The ambiguous region is not long (the average length of this region is about 5 characters), so there is no reason to expect subjects to have made a choice before they get syntactically disambiguating information. The fact that RTs are slightly longer in the region where the choice between structures is made is not particularly surprising; in the case of the Lookahead Choice model, the additional time can also be attributed to the necessity of building structure after making the decision; this structure has already been constructed in the control sentences. It is interesting that there is no significant difference between the intransitive and the optionally transitive verbs. This lack of difference may be because the syntactic disambiguating information comes in before lexical information is available to make a choice for either type of sentence.

## II. Is Verb Preference a Syntactic or Semantic Preference?

A second question raised by the evidence for verb expectations concerns whether the verb preference effect is syntactically or semantically based. Although various researchers have proposed various answers to this question, this is not an easy issue to address experimentally.

### II.1 Verb Preference as Syntactic Preference

Ford, Bresnan and Kaplan (1983) propose a quite specific theory of parsing in which the predicate argument requirements associated with the strongest lexical form of a verb are used to decide which syntactic structure to pursue. As long as some argument requirement is left unfilled, the parser will assume a structure that is compatible with the requirement. After all the required arguments of the strongest lexical form are identified, an alternative strategy called Final Arguments takes over. This strategy is essentially Late Closure: the parser assumes that any succeeding phrase is part of the final argument. Thus, their model assumes verb guidance at the syntactic level (although the motivation for the choice is in same ways equivalent to thematic structure). They argue that the effects cannot be due to subcategorization per se, since subcategorization applies at deep structure, while the arguments may come in diverse orders at the surface, and the Final Arguments strategy applies to the required argument that is final at the surface, not in the subcategorization frame.

Shapiro, Zurif and Grimshaw (1987) suggest that when a verb is identified, people automatically access all possible thematic structures associated with the verb, but not all subcategorization frames. They had people listen to sentences where the number of subcategorization frames and thematic structures associated with the verb were independently varied. Just after subjects heard the verb, they were presented with a word on a screen that they had to make a lexical decision to. A larger number of possible thematic structures delayed the decision; there was no effect of the number of subcategorization frames alone. They are not directly concerned with the question at hand; however, we might extrapolate from their evidence that only the most frequent subcategorization is accessed and used in parsing. However, this raises the question what role the thematic structures play.

One way of interpreting the verb preference effect as a syntactic effect would be to assume that the parser always uses the first (or only) subcategorization frame to guide or check analysis. This hypothesis predicts that the preferred structure and a required structure are used in the same way. We have already seen that there is evidence that this is not the case. Intransitivity **requirements** were used quite efficiently to identify a clause boundary in the Stowe and Holmes experiment described earlier.

Intransitive preference verbs, on the other hand, classed with transitive preference verbs in resolving this ambiguity. This does not provide a strong argument, since it is clear that in any case, the parser does have to be able to check for alternatives if the first fails. The difference is that no alternative can be found for the intransitive expectation verbs, but it can for the intransitive preference verbs. However, the hypothesis does predict that there should be an early difference like that found immediately after the obligatorily intransitive verbs. This prediction is not met.

### II.2 Verb Preference as Semantic Preference

Taraban and McClelland (1988) have explicitly suggested that the preceding context creates an expectation for a particular thematic role rather than a particular syntactic structure. They examined sentences with ambiguous prepositional phrase attachment, like *The janitor cleaned the storage area with the...*. This context creates an expectation that the sentence will be completed with some sort of cleaning implement or material, e.g. *broom* or, with a lesser predictability, *solvent*. Alternative endings, such as *manager*, either change the role that must be assigned, or, like *odor*, change both role and prepositional phrase attachment. They point out that if the expectation is syntactic, only the change in syntactic structure should have an impact on sentence processing time, while if the expectation is for a particular thematic structure, anything that does not match that semantic role should cause difficulties. Both *manager* and *odor* caused comparable difficulties, suggesting that any ending that does not match the thematic structure expectation is problematic. They conclude that the context generates an expectation for a certain type of thematic role to be filled, rather than for a certain syntactic structure to be constructed.

Another source of evidence that a change in semantic structure can result in very different processing comes form the late closure effect discussed earlier. Above it was shown that a change in verb preference does not affect how readily people determine a clause boundary when punctuation is unavailable, although subcategorization requirements can do so. Manipulating the thematic structure preference also results in disambiguation of clause boundary ambiguity sentences. Stowe (1988) compared sentences like those in (6).

(6) Even before the police stopped the driver was already getting nervous.
Even before the truck stopped the driver was already getting nervous.
Even before the police stopped at the lights the driver was already getting nervous.
Even before the truck stopped at the lights the driver was already getting nervous.

These sentences contained verbs like *stop*, for which an animate subject like *police* tends to be interpreted as an agent; if the subject is an agent, a transitive clause can be expected. The inanimate subject *truck*, on the other hand, tends to be interpreted as the patient (the entity which becomes motionless), after which an intransitive clause is appropriate. Subjects read sentences like those shown above, performing the self-paced continuous grammaticality decision described above. Subjects located the clause boundary late when the subject was animate and compatible with the transitive interpretation, but showed no trace of misanalysis when the subject was inanimate and most compatible with the intransitive structure. This pattern of results is compatible with the hypothesis that the thematic structure of the sentence can be used to choose between possible analyses. In fact it is as efficient as the requirement that the verb be intransitive. Is it possible that the verb preference effect can be reduced to thematic preference?

## III. The Experiment

The experiment to be reported here follows up on the Holmes, Stowe and Cupples (1987), experiment discussed above which demonstrated that verb preference is involved in the processing of reduced complement sentences. These results can be interpreted in two different ways. I have discussed the Limited Delay Choice model above. The thematic alternative is that verbs that normally occur with a complement clause prefer a "propositional" thematic role to be filled. That preference can be filled either by a complement clause or by a noun phrase that refers to a proposition, such as the answer. In the explanation of the results given above, it was assumed that a decision cannot be delayed long, so additional length causes the parser to reject the complement clause analysis of the ambiguous region. However, under the thematic preference account just proposed, the major factor in the decision is whether the thematic role preference is fulfilled by either analysis. Under this proposal, the fact that the noun phrase refers to a proposition allows the direct object analysis to be chosen. This is more likely to have happened in the long than the short version of the ambiguity, since, in the longer version, there is more time for the semantic content to be incorporated and a decision made on that basis before the syntactic disambiguation. If the verb preference effect actually involves something like a subcategorization preference, then the content of the noun phrase has relatively little impact on the decision.

This thematic hypothesis suggests that if the ambiguous noun phrase is a "plausible" object, which fulfills the preferred thematic structure of the verb, the direct object analysis will be adopted immediately, but if the ambiguous noun phrase is not a "plausible" object, that is, if it does not fulfill the preferred thematic structure of the verb, the direct object analysis will not be adopted prior to receiving syntactically disambiguating information. This prediction was tested, using sets of materials like those shown in Table 1. 32 sentence sets were created. Half of the sentence sets contained complement preference verbs followed by "plausible" objects, which can be interpreted as propositions. The other half contained implausible objects, where the propositional interpretation was not available; in fact these noun phrases were anomalous if interpreted as objects of the verb. The syntactic hypothesis predicts that only the factor of reduction will have significant effects, while the thematic hypothesis predicts that people will be more prone to garden path for the plausible objects, causing an interaction between plausibility and reduction.

**TABLE 1: SAMPLE MATERIALS FOR THE EXPERIMENT**

Plausible Objects:

- The girl learned that the answer was not obvious.
- The girl learned the answer was not obvious.
- The girl learned that the answer to the question was not obvious.
- The girl learned the answer to the question was not obvious.

Implausible Objects:

- The manager learned that the chairs had been removed.
- The manager learned the chairs had been removed.
- The manager learned that the chairs in the hallway had been removed.
- The manager learned the chairs in the hallway had been removed.

Four lists were created from these 32 sentence sets, by rotating through a Latin Square, such that each subject saw an equal number of sentences from each condition and each version from a particular sentence set was seen by an equal number of subjects. 66 filler sentences also appeared on all four lists. For each subject, he program randomly assigned one sentence from each condition and a set number of fillers to blocks and then presented the sentences in randomized order within each block, to avoid possible order effects.

The sentences were presented visually on a computer screen to subjects using the sequential display self-paced word-by-word reading task used by Holmes, Stowe and Cupples (1989). Subjects pushed a button identified as NEXT to get each word. The computer measured the time from the appearance of the word on the screen until the button was pressed as a measure of the difficulty of processing the word in a given context. When the subject requested the next word, the word currently on the screen disappeared, although the next word appeared spatially next to it, as if the whole sentence were on the screen. After the presentation of the final word in the sentence, a YES/NO question appeared, which subjects answered by pressing a button labeled YES or a button labeled NO. 48 subjects participated.

The mean reading times for positions in the embedded complement clause are shown in Table 2. Reading times that were more than 4.0 standard deviations above or below a subject's overall mean reading time per word (this was calculated for the entire set of sentences presented, fillers as well as target items) were set at that figure, to minimize effects of outliers on the overall means.

Analyses were performed at each position for the long and short versions separately. There was a main effect for reduction at the determiner for both long (F1(1,44)=16.60; F2(1.24)=14.83) and short (F1(1,44)=11.92; F2(1,24)=14.94) versions, with reduced complement sentences showing longer reading times than unreduced complements. Recall that the verbs used in the main clause were complement preference verbs. The same pattern appeared for the complementizer preference verbs in the Holmes, Stowe and Cupples (1989) study, although it was not significant. Moreover, there was a tendency in the same direction in the self-paced reading version of the Ferreira and Henderson study discussed above. It appears that as soon as subjects read the determiner, they realized that it was not a complementizer, which would be the most preferred word under the expected structure for the verb. As with other experiments looking at the verb preference effect, it is difficult to determine whether this reflects Verb Guidance, Verb Filter or a choice based on the verb.

**TABLE 2: MEAN READING TIMES AT COMPLEMENT CLAUSE POSITIONS**

| | DET | N | MOD1 | MOD2 | MOD3 | VERB | VERB1 | LAST |
|---|---|---|---|---|---|---|---|---|
| **Plausible Object** | | | | | | | | |
| Short Unambiguous | 375 | 398 | | | | 402 | 388 | 524 |
| Short Ambiguous | 387 | 402 | | | | 395 | 402 | 539 |
| difference | 12 | 4 | | | | -7 | 14 | 15 |
| Long Unambiguous | 370 | 406 | 407 | 387 | 393 | 403 | 412 | 571 |
| Long Ambiguous | 398 | 402 | 410 | 378 | 396 | 400 | 420 | 584 |
| difference | 28 | -4 | 3 | -9 | 3 | -3 | 8 | 13 |
| **Implausible Object** | | | | | | | | |
| Short Unambiguous | 369 | 411 | | | | 417 | 398 | 554 |
| Short Ambiguous | 405 | 402 | | | | 416 | 400 | 548 |
| difference | 36 | -9 | | | | -1 | 2 | -6 |
| Long Unambiguous | 368 | 392 | 419 | 379 | 406 | 415 | 409 | 617 |
| Long Ambiguous | 405 | 420 | 430 | 391 | 405 | 405 | 398 | 616 |
| difference | 37 | 28 | 11 | 12 | -1 | -10 | -11 | 1 |

There were no reliable effects of reduction at the complement clause verb phrase, for either short or long versions. This suggests that in this experiment, subjects did not typically misanalyze the subject of the embedded clause as a direct object, even when the ambiguous region was long. This must be either because people constructed or chose the correct analysis, or because they have not made a choice before they got syntactically disambiguating information. More particularly, people do not appear to garden path even when the ambiguous noun phrase plausibly fills the favored thematic role of the verb. Thus the experiment does not support the predictions made earlier under the hypothesis that verb preferences are thematic in nature.

## IV. Discussion

The question in this experiment was whether plausibility of an ambiguous NP as a filler of the thematic role expected by the verb would affect how people analyzed it. The answer to this question appears to be no. There is no suggestion that people are more likely to garden path in the ambiguous sentences if the ambiguous noun phrase can be interpreted as a proposition. The results of the current experiment suggest that people may fail to take an ambiguous noun phrase as direct object even when it fits the expected thematic role associated with the preceding verb. This cannot be due to a lack of sensitivity in the experimental method, since there is a clear effect of reduction at the determiner of the ambiguous noun phrase.

Taraban and McClelland's (1988) results suggest that thematic expectations do contribute to sentence processing times. Why should the current experiment show a different pattern of results? There are differences between the constructions tested that may suggest an answer. Taraban and McClelland were looking at an ambiguity where no syntactic information is generally available to decide which structure is appropriate. That is, the attachment of the prepositional phrase is a global ambiguity. The direct object/reduced complement ambiguity, on the other hand, is always eventually disambiguated by syntactic information; it is a local ambiguity. In the absence of a verb phrase for the embedded clause, the direct object analysis is the only possibility. In the presence of the verb phrase, the clausal complement analysis is the only possible structure.

How is this likely to affect the manner in which a decision between alternative structural analyses is made? If no further information is to be expected, it is sensible not to delay their decision. For the ambiguity where further information is to be expected, however, it is sensible to wait as long as possible before making this decision. It appears that for subjects in this experiment, it was possible to wait until syntactically disambiguating information became available.

## REFERENCES

Altmann, G.and Steedman, M. 1988. Interaction with context during human sentence processing. *Cognition* 30: 191-238.

Boland, J, Tanenhaus, M.K., Carlson, G.N., and Garnsey, S.M. Ms. Lexical projection and the interaction of syntax and semantics in processing. Unpublished ms., University of Rochester.

Carlson, G.N. and Tanenhaus, M.K.. 1988. Thematic roles and language comprehension. In W. Wilkins, ed., *Thematic relations: Syntax and Semantics 21*. San Diego: Academic Press.

Clifton, C.C., Jr., Frazier, L.and Connine, C. 1984. Lexical expectations in sentence comprehension. *Journal of Verbal Learning and Verbal Behavior* 23: 696-708.

Connine, C., Ferreira, F., Jones, C., Clifton, C.C., Jr., and Frazier, L. 1984. Verb frame preferences: Descriptive norms. *Journal of Psycholinguistic Research* 13: 307-309.

Crain, S.and Steedman, M. 1985. On not being led up the garden path: The use of context by the psychological syntax processor. In D. Dowty, L. Karttunen, and A. Zwicky, eds., *Natural language processing: Psychological, computational and theoretical perspectives*. Cambridge: Cambridge University Press.

Ferreira, F.and Clifton, C.C., Jr. 1986. The independence of syntactic processing. *Journal of Memory and Language* 25: 348-368.

Ferreira, F.and Henderson, J. 1990. Use of verb information in syntactic parsing: Evidence from eye movements and word-by-word self-paced reading. *Journal of Experimental Psychology: Learning, Memory and Cognition* 16:555-568.

Ford, M., Bresnan, J.and Kaplan, R. 1983. A competence-based theory of syntactic closure. In. J. Bresnan, ed., *Mental representation of grammatical structure*. Cambridge, MA: MIT Press.

Frazier, L. 1978. *On comprehending sentences: Syntactic parsing strategies*. Bloomington, IN: Indiana University Linguistics Club.

Frazier, L. 1989. Against lexical generation of syntax. In W. Marslen-Wilson, ed., *Lexical representation and processes*. Cambridge, MA: MIT Press.

Gorrell, P. 1987. Establishing the loci of serial and parallel effects in syntactic processing. *Journal of Psycholinguistic Research* 18:61-73.

Garnsey, S.M., Tanenhaus, M.K., and Chapman, R.S. 1989. Evoked potentials and the study of sentence comprehension. *Journal of Psycholinguistic Research* 18: 51-60.

Holmes, V.M., Stowe, L.A., and Cupples, L. 1989. Lexical expectations in parsing complement-verb sentences. *Journal of Memory and Language* 28: 668-689.

MacDonald, M., Just, M.and Carpenter, P. Ms. Working memory constraints on the processing of syntactic ambiguity. Unpublished manuscript, Carnegie-Mellon University.

Mitchell, D.C. 1987. Lexical guidance in human parsing: Locus and processing characteristics. In M. Coltheart, ed., *Attention and Performance XII*. Hillsdale, NJ: Lawrence Erlbaum.

Mitchell, D.C.. 1989. Verb-guidance and other lexical effects in parsing. *Language and cognitive processes* 4: 123-154.

Shapiro, L., Grimshaw, J., and Zurif, E. 1987. Sentence processing and the mental representation of verbs. *Cognition* 27: 219-246.

Steedman, M. 1989. Grammar, interpretation and processing from the lexicon. In W. Marslen-Wilson, ed., *Lexical representation and process*. Cambridge, MA: MIT Press.

Steedman, M.and Altmann, G. 1989. Ambiguity in context: A reply. *Language and Cognitive Processes* 4: 105-122.

Stowe, L.A. 1988. Thematic structure and sentence processing. In G.N. Carlson and M.K. Tanenhaus, eds., *Linguistic structure and language processing*. Dordrecht: Reidel.

Stowe, L.A. 1990. Delaying ambiguity resolution -- Temporarily. *Proceedings of the 2nd Meeting of the Midwest Artificial Intelligence and Cognitive Science Society*.

Stowe, L.A., Tanenhaus, M.K., and Carlson, G.N. In press. Filling gaps online: Use of lexical and semantic information in sentence comprehension. *Language and Speech*.

Tanenhaus, M.K., and Carlson, G.N. 1989. Lexical structure and language comprehension. In W. Marslen-Wilson, ed., *Lexical representation and processes*. Cambridge, MA: MIT Press.

Tanenhaus, M.K., Stowe, L.A., and Carlson, G.N. 1985. The interaction of lexical information and pragmatics in parsing filler-gap constructions. *The Proceedings of the 17th Annual Meeting of the Cognitive Science Association*, Irvine, California.

Taraban, R., and McClelland, J. 1989. Constituent attachment and thematic role assignment in sentence processing: Influences of content-based expectations. *Journal of Memory and Language* 27: 597-632.

ESCOL '90 286-294

# A-BAR MOVEMENT IN SPANISH: WH-QUESTIONS, FOCALIZATIONS AND RELATIVE CLAUSES*

**Almeida Jacqueline Toribio**
**Cornell University**

## 1. The Problem

In Spanish, wh-extraction of certain constituents is obligatorily accompanied by movement of the verb to the second position in the clause. In matrix questions, inversion applies obligatorily with object extraction, as in (1):

(1) a. ¿A quién vio María?
acc. who saw María
'Who did María see?'

b. *¿A quién María vio?

With subject extraction, the wh-phrase appears in sentence-initial position and the verb appears in second position, thus there is no apparent movement, as in (2):

(2) ¿Quién vio la película?
'Who saw the movie?'

By contrast, matrix adjunct extraction does not necessitate verb-second, as shown by the word order in (3):

(3) ¿Cuándo Juan consiguió por fin abrir la puerta ayer?
when Juan got finally open-infin the door yesterday
'When did John finally get to open the door yesterday?' (Torrego 1984)

Suñer (1989) and Toribio (1989) have suggested that the patterns of verb-second attested in Spanish are the result of a well-formedness condition, shown in (4), by which operators must be licensed.

(4) Wh-operators must appear in a locally lexically governed position at S-structure, save for adjuncts which are licensed at Logical Form.

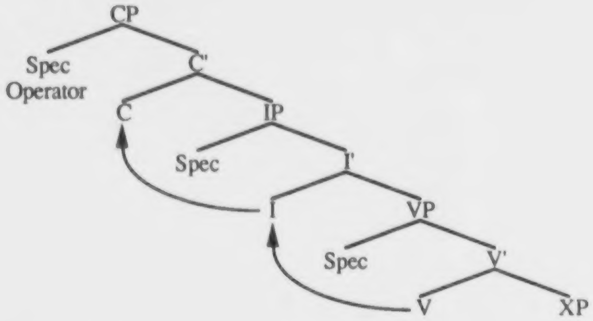
The government requirement imposes a restrictive locality condition which can be satisfied within a clause under m-command by a lexical head.

The prediction, then, is that inversion will apply at S-structure in certain wh-constructions to ensure that the position in which a thematic wh-phrase appears is lexically licensed. Spanish allows movement of V to INFL, where possible, and subsequent movement of V+INFL to C, as shown in (5). The verb can then license the wh-phrase in the specifier position of CP. With subject-wh extraction, too, the subject moves to SpecC and the verb raises to C, but their relative order remains intact.

---

* I am grateful to Wayne Harbert, Luigi Rizzi, Mamoru Saito and Margarita Suñer for their helpful comments.

(5)



Adjunct-wh elements are exempt from the lexical licensing, and therefore, verb-second is optional, as shown in (6):

(6) a. ¿En qué medida la constitución ha contribuido a eso?
in what way the constitution has contributeed to that
'In what way has the Constitution contributed to that?' (Torrego 1984)

b. ¿En qué medida ha contribuido la constitución a eso?

Spanish also demonstrates a verb-second pattern in embedded contexts. As within a matrix clause, verb-second is obligatory in an embedded clause headed by an argument wh-element:

(7) a. Juan me preguntó que qué libros había yo comprado en el extranjero.
Juan me-dat. asked that what books had I bought abroad
'Juan asked me what books I had bought abroad.' (Suñer 1989)

b. *Juan me preguntó que qué libros yo había comprado en el extranjero.

The verb-second in the sentence in (7a) is consistent with the proposal, put forward here, that wh-arguments must be locally licensed. Lexical government here is achieved by movement of V, via INFL, to C. The matrix verb cannot license the wh-phrase in the SpecC of the embedded clause because the lexical licensing must be local, i.e., within the same CP.

Verb-second is also optional when the embedded clause is headed by the trace of an extracted wh-element, as in (8):

(8) a. ¿Qué piensa María que Juan compró?
what thinks María that Juan bought
'What does María think that Juan bought?'

b. ¿Qué piensa María que compró Juan?

We can assume that the wh-trace is not subject to the well-formedness condition in (4). This is not surprising given that wh-traces are [-wh], as stated in Lasnik and Saito (1984), and hence are not identified as wh-operators for the proposed licensing condition (cf. Suñer 1989 who notes that wh-traces cannot satisfy a [+wh] subcategorization).

Finally, inversion is optional when a wh-adjunct appears in the embedded CP, as predicted by the condition in (4), and shown in (9):

(9) a. Juana no sabía cuándo los niños visitarían a sus abuelos.
Juana not know when the children visit-cond. acc. her grandparents
'Juan did not know when the children would visit her grandparents.' (Suñer 1989)

b. Juana no sabía cuándo visitarían los niños a los abuelos.

## 2. Extending the Data

At first glance, the well-formedness condition in (4) serves to account adequately for the patterns of inversion attested in the data presented thus far. However, it remains unclear why wh-adjuncts should be exempt from this licensing condition. A more serious criticism is the failure of the licensing condition to predict the patterns of verb-second in focalization constructions, which parallel those of wh-extraction; verb-second is obligatory with the argument focalization in (10), but optional with the adjunction focalization in (11) :

(10) a. Un viaje a las Canarias hizo Antonio este verano.
a trip to the Canaries made Antonio this summer
'A trip to the Canary Islands Antonio made this summer.' (Torrego 1984)

b. *Un viaje a las Canarias Antonio hizo este verano.

(11) Para mi el criado trajo una carta.
for me the servant brought a letter
'For me the servant brought a letter.' (Groos and Bok-Bennema 1986)

The condition in (4) also fails to predict the absence of (obligatory) verb-second in relative clauses, as in (12).

(12) Conozco al hombre que Juan admira.
(I) know acc. the man that Juan admires
'I know the man that Juan admires.'

Thus, subsequent paragraphs are devoted to providing a unified and accurate treatment of the data.

However, let us first look more closely at focalization. As we saw in (11), verb-second is attested with matrix argument focalization. The sentence in (13) demonstrates that embedded focalization of a thematic element also results in verb-preposing, as in (13):

(13) a. Ha dicho que un viaje a las Canarias ha hecho Juana.
(s/he) has said that a trip to the Canarias has made Juana
'S/he said that a trip to the Canary Islands Juana has made.'
(Groos and Bok-Bennema 1986)

b. *Ha dicho que un viaje a las Canarias Juana ha hecho.

Note that the focalized NP *un viaje a las Canarias* in the above sentences, an 'argumental' in the sense of Chomsky (1990), patterns like a wh-object with respect to inversion. By contrast, focalization of true adjuncts does not trigger obligatory inversion, as shown in shown in (14):

(14) Por esta razón Juana se fue a las Canarias.
'For this reason Juana went to the Canary Islands.'
(Groos and Bok-Bennema 1986)

Lastly, as with wh-extraction, traces of focalization do not trigger verb-preposing, as illustrated in (15):

(15) Un viaje a las Canarias dice Juan que la gente quería que Antonio hiciera este verano.
'A trip to the Canary Islands says Juan that people wanted that Antonio make this summer .' (Torrego 1984)

The striking parallel between wh-movement and focalization with respect to verb-preposing is suggestive of a uniform characterization of these data.

## 3. Licensing Operator Chains

Let us begin by suggesting that wh-movement and focalization both involve movement to SpecC. In so doing, we reject previous characterizations of focalization, according to which topic phrases are base-generated in initial position and a topic operator moves into COMP (cf. Rivero 1977, 1980). Let us assume also that since traces which are not required by the Projection Principle are deleted at S-Structure (cf. Lasnik and Saito 1984), the traces of argument-movement will remain, while those of adjunct-movement will be deleted.

Let us then define *operator* as indicated in (16):

(16) An operator is defined as an element in A-bar Spec which heads an A-bar chain and binds a variable.

It is worth noting here that raising does not trigger inversion, therefore the need to specify A-bar Spec in the definition of operator chain. By the definition in (16), A-bar chains headed by arguments are operator chains, whereas those headed by adjuncts are not. Now, recall that only A-bar movement of arguments triggers obligatory verb-preposing. We can account for the inversion patterns in a straightforward manner by imposing a well-formedness condition on operator chains.

The proposal is that operator chains must be licensed:

(17) Operators must be licensed by coindexation with a lexical head.

The theory allows two types of coindexation:

(18) Coindexation:
  a. specifier-head agreement, or
  b. predication agreement

Thus, movement of thematic elements will create an operator chain and be subject to (17), whereas movement of non-thematic operators will not create an operator chain, owing to the deletion of traces, and thus will not be subject to (17).

As stated previously, the licensing of operators in SpecC is achieved by movement of INFL + V to C. The result is that the operator comes to be in a specifier-head relation with the inflected verb which appears in C, as suggested, for example, by Kuroda (1986), Koopman and Sportiche (1987) and Rizzi (1989). On this view, movement of V to INFL and subsequent movement to C is necessary to allow for lexical licensing of the operator chain.

We also noted above that the patterns of inversion in embedded extraction parallel those of matrix extraction: verb-second is obligatory because the operator must be locally licensed. Such a locality condition need no longer be invoked to account for the patterns of verb-second -- specifier-head agreement is a local relation. We also do away with the need to invoke the non-operator status of traces in accounting for their behavior. Intermediary traces are not subject to the well-formedness condition in (17) because this condition applies to heads of operator chains, not to chain-internal elements.

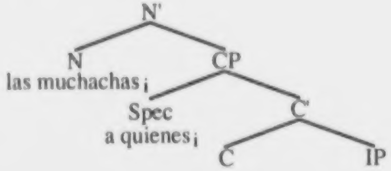
To summarize the discussion thus far, wh-movement and focalization of arguments will be subject to (17), hence inversion is triggered. By contrast, adjunct movement does not create operator chains, and hence inversion is optional.

As mentioned above, relative clauses do not involve obligatory inversion, this shown in (19):

(19) Las muchachas a quienes Juan invitó a la fiesta son mis compañeras.
the girls acc.who Juan invited to the party are my classmates
'The girls Juan invited to the party are my classmates.'

This lack of inversion follows as a natural consequence of the analysis put forward here. The fronted wh-element must be coindexed with the head noun of the relative clause, as shown in (20).

(20)



The coindexation that obtains in (20) is one of predication --notice that the head noun and the wh-relative agree in number. This coindexation allows for the operator chain to be licensed, hence satisfying the condition in (17). Thus, no ad hoc principle is needed to account for the lack of inversion in relative clauses.

Let us consider further evidence for the proposal put forward here. Verb-second is optional also in yes-no questions, as illustrated in (21):

(21) a. ¿María quiere comer?
María wants eat-infin
'Does Mary want to eat?'

b. ¿Quiere María comer?

Like overt operators, the abstract question operator in (21) should be subject to the licensing condition in (17); however, inversion is optional. We maintain here that the abstract question operator is not subject to the licensing condition (17) since it does not bind a variable and hence no operator chain is formed.

Consider next the movement of negative operators. When a thematic negative operator is moved to sentence-initial position, verb-second is obligatory. Consider the fronting of the negative operator as in (22):

(22) a. Ni siquiera un alma vio Juan en el cementerio.
not even a soul saw Juan in the cemetary
'Not a soul did Juan see at the cemetary.'

b. *Ni siquiera un alma Juan vio en el cementerio.

As expected, subject and object negative operators appear to behave differently with respect to inversion:

(23) Ni siquiera un estudiante llegó a tiempo.
'Not even one student arrived on time.'

Inversion in (22) is required with negative-object extraction in order that the negative operator be licensed. (23) illustrates that the subject operator is licensed, yet there is no apparent movement.

In addition, adjunct negative operators behave as do other adjunct operator chains -- inversion is optional, as in (24):

(24) a. Nunca en su vida había podido Juan asistir a un concierto de Julio.
never in his life has been able Juan to attend a concert of Julio
'Never in his life had Juan been able to attend a Julio concert.'

b. Nunca en su vida Juan había podido asistir a un concierto de Julio.

(25) a. Apenas había llegado Juan cuando llamó María.
hardly had arrived Juan when called María
'Hardly had Juan arrived when María called.'

b. Apenas Juan había llegado cuando llamó María.

Verb-preposing is optional with fronting of the adverbial negative operators in (24) and (25) owing to the deletion of traces and hence the failure to be defined as an operator chain.

The absolutive construction in (26) demonstrates movement of a argumental, and hence the formation of an operator chain; we therefore correctly predict that verb-second is obligatory:

(26) a. Tan aburrida estuvo la conferencia que Juan se durmió.
'So boring was the lecture that John fell asleep.'

b. *Tan aburrida la conferencia estuvo que Juan se durmió.

Similar patterns are attested with exclamatory sentences. Compare the argument extraction in (27) with the adjunct extraction in (28).

(27) a. Qué sed me contó Juan que había pasado la gente aquel día!
what thirst me-dat told Juan that had passed the people that day
'How thirsty John told me that people were that day!' (Torrego 1984)

b. ???*Qué sed Juan me contó que la gente había pasado aquel día!

(28) Qué tarde me contó Juan que la gente había llegado!
how late me-dat. told J. that the people had arrived
'How late Juan told me that people had arrived!'

Again, the argument-adjunct asymmetry is accounted for given that movement of the former creates an operator chain whereas movement of the latter does not.

Consider again the inversion patterns of embedded extraction below:

(29) a. Preguntaron que a quién invitará Juan al concierto.
(they) asked that acc. who invite-fut. Juan to the concert
'They asked me whom Juan will invite to the concert.'

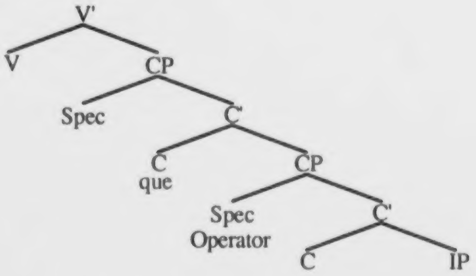
b. *Me preguntaron que a quién Juan invitará al concierto.

(30) a. Ha dicho que un viaje a las Canarias ha hecho Juana.
s/he has said that a trip to the Canarias has made Juana
'S/he said that a trip to the Canary Islands Juana has made.'
(Groos and BokBennema 1986)

b. *Ha dicho que un viaje a las Canarias Juana ha hecho.

Notice that in both the wh-movement construction in (29) and the focalization construction in (30) the extracted element appears in the specifier position of the embedded CP. Inversion is obligatory with both instances of movement. The matrix verb in these constructions cannot serve to lexically license the operator chain since neither spec-head agreement nor predication agreement obtains. However, in (29) and (30), the extracted wh-element co-occurs with the complementizer *que* 'that'. Yet this complementizer does not serve to lexically govern the operator chain? This behavior may suggestive of the fact that the wh-element is not contained within the same CP as the complementizer, as proposed by Suñer (1989) and depicted in (31). We predict, then, that inversion will be required to license the operator chain.

(31)



## 4. Summary

To summarize, wh-questions, focalizations and relative clauses, among other types of A-bar movement, have been given a unified treatment. A-bar movement in each of these constructions creates an operator chain. It has been proposed herein that operator chains must be licensed by coindexation with a lexical head; this coindexation may be achieved by specifier-head agreement or by predication agreement. Note that since coindexation is already available in the grammar, no ad hoc restriction is necessitated. The inversion which accompanies matrix and embedded extraction in wh-movement and focalization is necessary to satisfy this well-formedness condition. Extraction in relative clauses is not accompanied by verb-second because the relative operator is licensed by predication agreement with the relative head. Adjunct operators do not require verb-preposing because their movement does not create an operator chain in the sense relevant for the licensing condition. Lastly, operator chain-internal traces are not subject to licensing since the requirement holds of the head of the chain.

## References

Chomsky, N. 1990. Talk given at Cornell University, Spring.

Chomsky, N. 1986. Barriers. MIT Press.

Groos, A. and R. Bok-Bennema. 1986. The structure of the sentence in Spanish. In I. Bordelois, H. Contreras and K. Zagona (eds.) Generative studies in Spanish syntax. Foris, Dordrecht.

Harbert, W. and G. Webelhuth. In preparation. Some notes on Case Theory. Cornell University manuscript.

Koopman, H. and D. Sportiche. 1988. Subjects. University of California at Los Angeles manuscript.

Kuroda, Y. 1986. Whether we agree or not. University of California at San Diego manuscript.

Lasnik, H. and M. Saito. 1984. On the nature of proper government. Linguistic Inquiry, 15.

Rivero, M.L. 1980. On left-dislocation and topicalization in Spanish. Linguistic Inquiry 11.

Rivero, M.L. 1977. On topicalization and wh-movement in Spanish. Linguistic Inquiry 9.

Rizzi, L. 1989. Relativized Minimality. MIT Press.

Suñer, M. 1989. Indirect questions: Implications for the structure of CP. Cornell University manuscript.

Toribio, A.J. 1989. Auxiliary/verb-second in English, Spanish and code-switching. Cornell University manuscript.

Torrego, E. 1984. On inversion in Spanish and some of its effects. Linguistic Inquiry, 15.

ESCOL '90 295-306

# THE ROLE OF PLASTICITY IN THE ASSOCIATION OF FOCUS AND PROMINENCE*

Enric Vallduví
University of Pennsylvania/University of Southern California

## 1 Introduction

As is well known, information packaging (cf. Chafe 1976, Prince 1986), with its core notion of focus, is an important determinant of the surface structural shape, syntactic and prosodic, of sentences. It has been noted that the informational focus of the sentence is almost universally marked by intonation in the sense that (a subset of) the focus must lie under the most prominent point of the pitch contour (cf. Sgall et al. 1984, Lambrecht 1987, inter alia). This state of affairs we may call the TOGETHERNESS of focus and intonational prominence. This is indeed the case in English, where intonational prominence may be shifted to different positions in the clause to accomodate different focus readings for the sentence while the syntactic structure remains constant.[1] This well-known pattern is illustrated in (1).[2]

(1) a. The boss hates BROCCOLI.
b. The boss HATES broccoli.
c. The BOSS hates broccoli.

The togetherness of focus and prominence, however, is not always achieved the way it is in English. This paper shows that there are at least two ways across languages in which the togetherness of focus and prominence is attained. This crosslinguistic variation is illustrated with examples from Catalan and English. Contrary to English, in Catalan intonational prominence is fixed on clause-final position and syntactic operations must be used to make the focus (or a subset of it) fall under prominence. In other words, the syntactic structure of the sentence is altered while the intonational structure remains constant. It is proposed that this crosslinguistic variation illustrated by Catalan and English is the reflex of a PLASTICITY PARAMETER of intonation relative to focus where English instantiates the value [+plastic] and Catalan the value [-plastic].[3] This is expressed in (2):

(2) Plasticity parameter:

[+plastic]: intonation contour may be molded to attain the togetherness of focus and prominence (English).
[-plastic]: intonation contour may not be molded to attain the togetherness of focus and prominence, which must be attained by other means (Catalan).

This paper is structured as follows. First, the notion of 'focus', as used below, is defined. Second, the data from Catalan and English will be introduced. Third, it is shown that the intonational contour in Catalan is indeed fixed and we discuss the effects that this has on verbal complements and subjects. Finally, some possible counterexamples to the predictions made are discussed.

## 2 Focus-Ground

Information packaging, as used by Chafe 1976 and Prince 1986, is a structuring of the information contained in a sentence according to the speaker's believes about the hearer's knowledge and attentional state. In Vallduví 1990b this packaging is viewed as a small set of instructions to the hearer about how to enter information into her/his knowledge store. From this perspective, the sentence is divided into a FOCUS and a GROUND, which are defined as in (3):

(3) Focus: What the hearer is instructed to enter into her/his knowledge-store.
Ground: Elements that indicate where and how to enter the focus.

This partition is equivalent in empirical coverage to the focus-presupposition or focus/open-proposition division (Chomsky 1971, Jackendoff 1972, Ward 1985, Prince 1986, Rochemont 1986, among others), the focus-topic articulation of modern Prague School linguistics (Sgall et al. 1986), and the OldInfo-NewInfo split of Välimaa-Blum 1988.

A given sentence may be focal in its entirety if no indication of where its content goes in the hearer's knowledge-store is needed (all-focus sentences). The ground, if there is one, is further subdivided into two elements. One, the LINK, which more or less corresponds to the sentence-initial topic or theme in Halliday 1967, Reinhart 1982, and Välimaa-Blum 1988, indicates where or under which address in the hearer's knowledge-store the focus must be entered. The other, the TAIL, indicates how the focus is entered under a given address. This may be illustrated with an example from English. In (4)a there is a link, *the boss*, and the focus, *hates broccoli*. This sentence corresponds to a prototypical topic-comment structure (cf. Gundel 1987). In (4)b there is a complex ground composed of a link as above and a tail, *broccoli*, while the focus is only the verb.[4] The informational interpretation of these sentences is, following the definitions above, as indicated under the sentences in question:

(4) a. The boss [ hates BROCCOLI. ]
b. The boss [ HATES ] broccoli.

a. Under the address 'the boss' in your knowledge-store add that he hates broccoli.
b. Under the address 'the boss' in your knowledge-store substitute 'hates' for *v* in 'he *v* broccoli' (which is already under that address).

It is clear that from this perspective prosodic prominence does not define focus, but it is just a structural correlate, a way to represent or encode focus in the surface structure of sentences.

Now that the primitive 'focus' has been defined, let us compare the way in which this primitive is structurally encoded in Catalan and English.

## 3 Catalan and English

As was noted, sentences like (4)a are articulated only into a link and a focus. This sentence presents identical structural characteristics, both syntactic and prosodic, in both Catalan and English, as shown in (5).

(5) a. The boss [ hates BROCCOLI. ]
b. L'amo [ odia el BRÒQUIL. ]

There's a sentence-initial link (i.e. topical) element followed by the focus, which is marked by having its rightmost word receive prosodic prominence.

This total parallelism between Catalan and English disappears, though, when sentence types other than link-focus structures are considered. The examples in (6) are link-focus-tail examples (cf. (3)b above) and the examples in (7) are all-focus sentences:

(6) a. The boss [ HATES ] broccoli.
b. L'amo [ $l_1$'ODIA $t_1$, ] el bròquil$_1$.

(7) a. [ The BOSS called.]
b. [ Ha trucat l'AMO. ]

In these examples, just as in (5), prominence falls on the same constituents in Catalan and English. The syntactic configuration of the sentences in question, however, is clearly different. In (6) the tail constituent appears in situ in English but in a righthand clause-external position in Catalan, while a gap appears in situ and a coindexed clitic is attached to the verb. In (7)b, the all-focus structure, the subject *l'amo* 'the boss' is prominent as in English, but its syntactic position is postverbal and not preverbal. To summarize, both languages have identical assignment of prosodic prominence but divergent syntactic configurations under this assignment of prominence.

The main body of the paper is devoted to showing how the syntactic configuration of the catalan sentences is the result of the [-plastic] nature of Catalan. In other words, it will be shown that, since prominence in Catalan cannot be shifted back and forth to mark focus, the syntax is therefore affected.

## 4 Fixed intonational prominence

In example (6)b above the object NP *el bròquil* 'the broccoli' in the Catalan sentence is found, as in English, to the right of the prominent constituent. Strictly speaking, prominence is not found on the rightmost constituent in the sentential string. Why do we say, then, that prominence in Catalan is fixed on clause-final position? Let us see why.

A sentence with a verb-object-locative sequence like (8)a,

(8) a. [ Fiquem el ganivet al CALAIX. ]
1p-put the knife in.the drawer
'We put the knife in the DRAWER.'
b. *Fiquem al calaix el GANIVET.
c. *Fiquem el GANIVET al calaix.

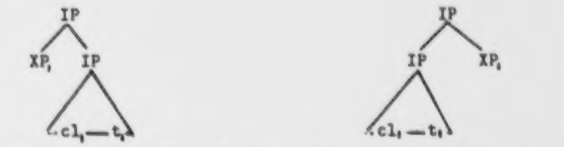
presents two important characteristics: *a*) the order of the complements is invariable, as shown by (8)b, in that the direct object must precede the locative phrase, and *b*) prominence cannot be shifted to the left, as shown by (8)c, and, therefore, prominence cannot be placed on the direct object. Given these facts, the question that arises now is what surface representation a sentence with a nonfocal locative would have. If both prominence and the locative phrase must be clause-final, nonfocal locative phrases should be impossible. There is a way in which locative phrases can be marked as nonfocal, but before this issue is addressed we shall consider the case in which the direct object must be marked as being part of the ground, i.e. must be removed from the scope of prominence.

To mark a direct object as being part of the ground it must be detached to a clause-external position adjoined to IP. It may be detached either to the left or to the right of the core clause, as in (9)a and (9)b, depending on whether it is a link or a tail, respectively. This detachment, as noted above, leaves behind a gap and triggers the appearance of a coindexed clitic attached to the verbal head:

(9) a. El ganivet$_1$ [ el$_1$/(*) fiquem t$_1$ al CALAIX. ]
b. [ El$_1$/(*) fiquem t$_1$ al CALAIX, ] el ganivet$_1$.
c. *El fiquem el ganivet al CALAIX.

The adjunction-to-IP analysis is the one proposed for topicalization in English by Baltin 1982 and Rochemont 1989, who also extends it to Romance, specifically Italian. The structure adopted for sentences like (9)a and (9)b is as in (10):

(10) **left-detachment:** **right-detachment:**



There are three pieces of evidence for the position that the detachment slot is external to IP. First, the mandatory presence of the clitic *el* coreferential with the detached phrase in the sentences in (9) (cf. the starred cliticless versions of those examples) in both left- and right-detachment. It is independently known that in Catalan clitics appear if and only if the complement slot they are coindexed with is empty at the surface.[5] This is illustrated by (11) and (12) with a direct object and a locative phrase, respectively. Note that the presence of a clitic is ungrammatical if the corresponding argument is in situ, as indicated by (9)c, (11)a, and (12)a:

(11) a. (*La$_1$) conec ta COSINA$_1$.
*obj* 1s-know your-*f* cousin-*f*
'I know your cousin.'
b. La$_1$/(*) conec e$_1$.
'I know her.'

(12) a. (*Hi$_1$) visc a Los ANGELES$_1$.
*loc* 1s-live in Los Angeles
'I live in Los Angeles.'
b. Hi$_1$/(*) visc e$_1$.
'I live there.'

Furthermore, the parallel behavior of (9)a and (9)b above suggests that if the position occupied by a left-detached phrase is clause-exteernal, as seems to be the case merely from linear order considerations, so must the position of the right-detached phrase.

Second, the linear position of the direct object after the locative in (9)b violates the strict linear order requirement complements must satisfy. Compare (9)b with (8)b, which shows that the complements of the verb cannot undergo permutation in the clause. The position of a direct object to the right of the locative phrase is only possible if it is right-detached to an adjuntion-to-IP position, leaving a clitic copy behind.[6]

Finally, there is evidence from the licit placement of clause-peripheral particles like *xec* 'man' and the tag *oi* 'right?' between the clause and the detached phrases, as shown in (13)a, (13)b, and (14)a. Examples (13)c and (14)b show that these particles occur at clause boundaries but not clause-internally.

(13) a. El ganivet$_1$, xec, [ el$_1$ fiquem t$_1$ al CALAIX. ]
b. [ El$_1$ fiquem t$_1$ al CALAIX, ] xec, el ganivet$_1$.
c. Fiquem (*xec) el ganivet (*xec) al CALAIX, xec.

(14) a. [ El$_1$ fiquem t$_1$ al CALAIX, ] oi, el ganivet$_1$?
b. Fiquem el ganivet (*oi) al CALAIX, oi?

Contrast the licit placement of these clause-peripheral elements between the detached phrases and the clause with their illicit placement within the clause proper. If they can be placed, say, before the right-detached phrase, this indicates that there is a clause boundary there, i.e. that they are clause-external.

Returning to the case where the clause-final locative had to be marked as nonfocal, it seems clear now that detachment, used as a means to remove elements from the scope of prominence, will be the way to remove the locative from its in situ slot, thus allowing it to escape an otherwise forced focal interpretation. This is illustrated in (15), with both a right- and a left-dislocation.

(15) a. [ Hi$_1$/(*) fiquem el GANIVET t$_1$, ] al calaix$_1$.
b. Al calaix$_1$ [ hi$_1$/(*) fiquem el GANIVET t$_1$. ]
c. *Hi fiquem el ganivet al CALAIX.

This patterns exactly like the case of the direct object, just discussed, except in one respect. In the right-detachment of the locative thre is no permutation in the linear order of the verbal complements, i.e. both the canonical sentence, (8)a, and the righ-detached example in (15)a present the same string order object-locative. However, the clitic facts are as above (presence is illicit when the argument is in situ, mandatory when the argument is not), as shown by the contrast between (15)a and (15)c, and the clause-peripheral particles also pattern as above, as indicated by the contrast in (16):

(16) a. [ Hi$_1$ fiquem el GANIVET t$_1$, ] xec, al calaix$_1$.
b. *Fiquem el ganivet, xec, al CALAIX.

Summarizing these facts, the only way to get a non-clause-final VP element to receive prominence is by right- or left-detaching the elements that follow it to its right, as in the case of (15)a-b above, or even in cases where more than one element must be detached, as in (17)a and (17)b (the detached phrases may appear in any linear order: object-locative or locative-object):

(17) a. [ L$_1$'hi$_2$ FIQUEM t$_1$ t$_2$, ] al calaix$_2$, el ganivet$_1$.
b. El ganivet$_1$ al calaix$_2$ [ l$_1$'hi$_2$ FIQUEM t$_1$ t$_2$. ]
c. *FIQUEM el ganivet al calaix.

The non-clause-final element is thus allowed to become clause-final so that it can receive prominence. Note that a mere shifting of the prominence is not allowed in the case of (17) either (cf. (17)c). Also, the only way to have a clause-final constituent escape prominence is by removing it from the clause by means of a detachment, as in the case of the locative above. It must be concluded from these that prominence is fixed on clause-final positions and that constructions where it may seem that the intonation has been shifted to the left, like (15)a, are actually configurations where sentence elements have been detached from within the core clause to a position to the right of clause-final prominence. Catalan is, then, [-plastic].

## 5 Subjects

Let us now discuss the contrast between the all-focus sentences in (7), repeated here as (18) and the link-focus sentences in (19):

(18) a. [ Ha trucat l'AMO. ]
3s-prpft-call the.boss
b. [ The BOSS called. ]

(19) a. L'amo$_1$ [ ha TRUCAT t$_1$. ]
b. The boss [ CALLED. ]

In English the same string sequence 'the boss called' may have two prosodic structures depending on the scope of focus in the sentence. Prominence may appear on the verb if the sentence is a link-focus structure like (19)b, but it may appear on the subject if we are dealing with an all-focus sentence like (18)b.[7] This behavior is expected from a [+plastic] language.

But how does Catalan encode these different focus readings? Given its lack of plasticity it must resort to syntactic operations. Compare examples (18)a and (19)a above. In (18)a the subject is clause-final and lies under the scope of prominence. In this case the subject is focal. But subjects, if they are nonfocal, may be right- or left-detached as well (just like any other argument). The example in (19)a above contains a link subject which has been left-detached, while (20) contains a tail subject in a right-detachment slot:

(20) [ Ha TRUCAT $t_1$, ] l'amo$_1$.

Subjects, however, do not require a clitic copy in the clause since Catalan is a null-subject language. But the clause-external status of detached subjects may be established through the other diagnostics. The clause-peripheral *xec* 'man' may appear between the clause and the detached phrases as in (21)a and (21)b but not inside the clause (21)c:

(21) a. L'amo$_1$, xec, [ ha TRUCAT $t_1$. ]
b. [ Ha TRUCAT $t_1$, ] xec, l'amo$_1$.
c. [ Ha trucat (*xec) l'AMO, ] xec.

Furthermore, now that it has been independently established, from the bahvior of complements, that prominence must be clause-final, it seems clear that the contrast in (22),

(22) a. Ha trucat l'AMO.
b. Ha TRUCAT $t_1$, l'amo.

is not the result of a prominence shift but that of a different syntactic configuration in each sentence, the subject in (22)a being in situ while the subject in (22)b is in a right-detachment slot.[8]

## 6 Potential counterexamples

The [+/-plastic] distinction leads us to expect that [+plastic] languages will not use syntax to attain the togetherness of prominence and focus, while [-plastic] languages will have to, since they cannot resort to prominence shifting. This seems to be indeed the case for the examples discussed in the previous sections. However, it was also noted that the structural representation of linkhood requires overt syntactic operations in both English and Catalan, consisting of a preposing of the link if it is not a subject. This is the case in examples like (23)a:

(23) a. Broccoli$_1$ he HATES $t_1$.
b. He HATES broccoli.

In this example the togetherness of prominence and focus is achieved thanks to the syntactic fronting of *broccoli*, but this result is just an indirect consequence of the movement. The same togetherness could have been achieved by a mere shift of prominence if *broccoli* had not been a link, as in (23)b. In other words, the fronting in (23)a is the structural encoding of the linkhood of the object, not of the focushood of the verb, which is signalled by prosody as expected.

But even leaving the case of link-fronting aside, potential counterexamples to the claim that [+plastic] languages do not use syntax to attain togetherness are still encountered. Similarly, there's one potential counterexample to the claim that [-plastic] languages never use prosody for this purpose. These cases will be now discussed.

## 6.1 English focus-preposing

The existence of focus-preposing (a.k.a. focus-topicalization, focus-movement, Y-movement, or rhematization), illustrated in (24)b, is problematic. Notice the availability of a non-focus-preposed version of this sentence in (24)a.

(24) a. They named it [ FIDO ].
b. [ FIDO$_1$ ] they named it $t_1$.

Obviously, the former involves a syntactic operation, and it seems that its purpose is to structurally encode the focus, contrary to expectation from the point of view of the [+/-plastic] distinction. Example (24)b, however, is a counterexample only if it assumed that it is totally informationally synonymous with (24)a, i.e., if it is assumed that the informational load of (24)b is only the marking of *Fido* as focus.

But there is arguably a contrast between the two sentences in (24) that renders them not equivalent in their informational understanding. Ward 1985 points out that focal preposing shares some informational characteristics with nonfocal preposing, i.e. link-preposing. Ward's observation, grossly sumarizing his point, is that the phrase *Fido* in (24)b also represents a set or scale to which the value 'Fido' belongs and that, through the preposing, this set or scale is marked as evoked and salient in the discourse. In the terms used in this paper, it can be said that *Fido* in (24)b has an informational dual status: it marks a set or scale as being the link and it indicates that 'Fido' is the specification of a value in that scale. Only this second part is focal. Sentence (24)a, in contrast lacks the link reading for the set or scale. The intended informational reading for (24)b could be informally represented as in (25):

(25) Set-of-dog-names$_1$, they named it Fido$_1$.

It may be argued, then, that the surface position of *Fido* in (24)b is due to its partial status as link and not to its partial status as focus, thus incorporating Ward's generalization about preposing in English and, in consequence, preserving the validity of the plasticity claim.

## 6.2 Clefts

It has been long recognized that it-clefts like (26),

(26) It's [ BROCCOLI$_1$ ] the boss hates $e_1$.

are focus-ground constructions in that they represent this information articulation straightforwardly by clefting the focus away from the ground (cf. Prince 1986) Again, if focus-ground marking were the only task performed by it-clefts, their existence would be unexpected and unnecessary given that English is a [+plastic] language.

If, however, focus-ground marking is the only task performed by it-clefts, a total equivalence between (27)a and (27)b must be assumed,

(27) a. It's [ a SHIRT$_1$ ] she gave $e_1$ to Harry.
b. She gave [ a SHIRT ] to Harry.

However, it is also known (e.g. Ward 1985) that it-clefts and prosodically-marked focus-ground constructions like (27)b present divergent behavior in some occasions. Compare the two sentences in (28):

(28) a. *It's [ NOBODY ] I saw $e_1$ at the party.
b. I saw [ NOBODY ] at the party.

Sentence (28)b, a regular focus-ground construction, may have *nobody* as its focus, but the equivalent it-cleft becomes ungrammatical in the same situation, as shown by (28)a.

This contrast seems to be due to the fact that the ground in focus-ground constructions is not presupposed in any semantic sense (despite the common use of the term '(pragmatic) presupposition' to refer to the ground). In other words, *I saw somebody at the party* is not presupposed by (28)b. However, *I saw somebody at the party* is indeed a presupposition of the sentence in (28)a, or any sentence with the structure *It's x that I saw at the party*. Sentence (28)a is ungrammatical because a contradiction arises between it and its presupposition. Sentence (28)b is licit because such a contradiction does not arise. If this analysis is correct, then it-clefts are not exclusively marking focus-ground relations but have an additional task of a logico-semantic nature, namely that of structurally encoding (certain) presuppositions.[9]

This observation coincides with the data on it-clefts in Delin 1990, which points towards these discrete dual logico-semantic and informational functions of the construction. And most likely, the informational role of it-clefts is parasitic on their logico-semantic role, since, in some occasions, the clefted element is definitely nonfocal. If this is the case, the existence of it-clefts is not a problem for the predictions made by the plasticity parameter and the status of English as [+plastic].

## 6.3 Catalan 'focus-preposing'

In Catalan there are constructions like (29) and (30) that appear to be in contradiction with the claim that Catalan is a [-plastic] language:

(29) [ El JULI, ] ficarà el ganivet al calaix.
'[ JULI ] will put the knife in the drawer.'

(30) [ Al CALAIX, ] ficarà el ganivet el Juli.
'Juli will put the knife [ in the DRAWER. ]'

In sentence (29) prosodic prominence has apparently been shifted to the sentence-initial position. This runs contrary to the claim that prominence in Catalan is necessarily clause-final. Similarly, in (30) there is a case of apparent focus-preposing of the sort just discussed for English. Here it seems like prominence has been shifted to the clause-initial slot as well.

This constructions, in fact, have been traditionally analyzed as focal preposings involving a fronting of the focus to a clause-external position to the left of the core clause (cf. Bonet & Solà 1986). Under close inspection, however, the phrases to the right of the focus behave like regular right-detachments of the kind discussed above. The only difference is that in (29) and (30) we have detachments of not only verbal complements but also of the verbal head as well. In particular, these sentences present, just as uncontroversial right-detachment does, free string order among the postfocal phrases. Remember that Catalan has a strict word order pattern within the core clause and that deviations from the pattern, other than via detachment, are illicit. Interestingly, though, the postfocal phrases in (29) and (30) may appear not only in that string order, which is the canonical one, but also in any other order. This is illustrated for (30) by (31):

(31) [ Al CALAIX, ] ficarà, el ganivet, el Juli.
..., ficarà, el Juli, el ganivet.
..., el Juli, el ganivet, ficarà.
..., el Juli, ficarà, el ganivet.
..., el ganivet, el Juli, ficarà.
..., el ganivet, ficarà, el Juli.

This characteristic is typical of right-detached phrases, which allow any linear combination in their adjunction to the right of IP (the same is true of left-detachment). If the postfocal phrases in (31) are right-detached thier behavior is not surprising. If they are in situ, however, it remains totally unaccounted for. This and other evidence for this analysis is dicussed with further detail in Vallduví 1990b.

Given this analysis, the prominent phrase in sentences like (29) and (30) remains in situ, while the other phrases undergo detachment. This makes the in situ phrase actually appear in clause-final position, which guarantees its receiving default (actually mandatory) intonational prominence. Once again, togetherness is attained exclusively by means of syntactic operations without resorting to prominence shifts.

The potential counterexamples discussed in this section have been given plausible alternative explanations and therefore the plasticity parameter can be maintained and its predictions with respect to the use of syntax and prosody in English and Catalan are born out.

## 7 Conclusion

Let us conclude by reviewing the consequences and ramifications of the distinction put forth in this paper.

First, given the above facts above Catalan and English we are led to the conclusion that, while prominence and focus go together, the plasticity of each particular language determines how this togetherness is achieved. In [+plastic] languages like English it is achieved by means of prosody without resorting to syntactic operations, while in Catalan, which is [-plastic], the togetherness of focus and prominence must be achieved through the syntax, thus determining, in part, the surface syntactic configuration.

Second, and as an immediate consequence of the first point, if the [+/-plastic] parameter is taken into account, we may have found a reason for the fact that the surface position of the major constituents in English tends to reflect grammatical/thematic relations while in Catalan it reflects informational notions. In other words, in Catalan the surface syntactic position of, say, an object NP reflects its status within an informational instruction and not its position in a thematic or case grid, which is recovered by means of a series of coindexed clitics and empty categories. The opposite, notwithstanding the existence of topicalization, is generally the case in English: whether the object NP is (part of) the focus or the tail, it remains in situ.

There is at least another type of language, to which Basque and Hungarian belong, which seems to instantiate the [-plastic] value of the parameter as well. Unlike Catalan, however, prominence does not seem to be mandatorily clause-final but seems to necessarily fall on a fixed preverbal position in which focal elements must appear. Achieving togetherness in this manner gives rise to a number of syntactic operations as well (cf. Horvath 1986). It remains to be seen how Catalan differs from this languages once typological differences like basic word order are taken into account, but Hungarian clearly coincides with Catalan in having the surface position of the major constituents in the sentence encode informational notions, as indicated by Kiss 1981.[10]

Third, it becomes clear that [-plastic] languages have a 'freer' word order. In the case of Hungarian, it has led some scholars to the conclusion that it is not a 'configurational' language. If Catalan lacked the clitic morphology it now possesses, it would be much harder to determine if it is 'configurational' or not. Remember that Catalan, despite the fact that it has a strict word order within the core clause, becomes a 'free' word order language once the availability of detachment is taken into account. The [+/-plastic] parameter may be an important determinant of the existence of free word order in natural language, although obviously not the only one.

Finally, any attempt to come up with a universal characterization of the representation of information packaging in language will have to take into account the [+/-plastic] distinction. Plasticity must be factored out from a crosslinguistic structural representation of information packaging, which should be constant across languages. Divergence from this constant representation will be due, in part, to the [+plastic] or [-plastic] nature of each particular language.[11]

The following is a summary of the above observations:

- [+/-plastic] determines how the togetherness of focus and prominence is achieved.
- [+/-plastic] determines in part the surface structure of languages: English represents mostly thematic structure, Catalan informational structure.
- [-plastic] languages have a 'freer' word order.
- Factoring out plasticity from the crosslinguistic representation of information packaging should yield a more constant universal characterization of this representation.

# FOOTNOTES

[*] J. Hoeksema, A. Kroch, and E. Prince offered valuable help as advisors and supervisor, respectively, of my dissertation, of which this paper is a spinoff. Several members of the audience made important observations during the oral presentation of the paper as well. The author is nevertheless responsible for any errors of fact or interpretation.

1. For an instrumental analysis of focus-relevant pitch see Horne 1988. Selkirk 1984 studies the exact mapping mechanisms between prosodic structure and syntax in the case of English. Some scholars, who analyze wh-words in wh-questions as foci, do not agree with the claim that in English prominence must necessarily fall on the focal element (cf. Rochemont 1986).

2. Here and throughout the paper small capitals signal the lexical item containing intonational prominence. Brackets ([ ]), in examples further down, delimit the focus (and attached clitics for verbal foci).

3. The reason for stating that plasticity is a property of intonation *only* relative to focus is that intonation is known to performs other tasks besides the formal marking of foci: contrastive topics also receive some prominence, illocutionary meaning (e.g. questions, exclamations) is often (partially) encoded in intonation, and even metalinguistic facts (e.g. corrections) affect intonation. Plasticity has nothing to say about these and other possible uses of intonation.

4. Link-focus constructions are also equivalent to predicate focus sentences in Lambrecht 1987 and to categorical judgments in Kuroda 1972 and Sasse 1987. Link-focus-tail constructions are sometimes called 'narrow' or 'constituent' focus sentences or variable-containing constructions (Prince 1986). All-focus sentences correspond to Kuno's (1972) neutral descriptions, Schmerling's (1976) news sentences, Kuroda's and Sasse's thetic judgments, and Lambrecht's sentential focus constructions.

5. There are two well-known exceptions to this generalization. One, the optional presence of a clitic coreferential with indirect objects, and two, the mandatory presence of a clitic accompanying (strong) pronominal complements in situ.

6. One exception to this is the existence of heavy-NP shift, which behaves as it does in English.

7. There is a third focus reading where only the subject is focal. This case is prosodically homophonous with the all-focus sentence. This third reading, however, is only tangential to our discussion here.

8. It has been assumed here that the base position of the subject in Catalan is postverbal. This view is not the traditional one, but it is independently argued for in Bonet 1989. The evidence in support of considering the preverbal position derived is significant and is supported by several proposals in the recent syntactic liturature on Romance (cf. Vallduví 1990b).

9. It is not the case that the ungrammaticality of **It's* NOBODY *that I saw at the party* is the result of a potential incompatibility of quantifiers and the clefted position in it-clefts. Sentences like *It's every* CHAPTER *that you have to read* or *It's only some* PEOPLE *that hate their kids* are grammatical.

10. French, like Catalan, is also a [-plastic] language and uses detachment as a means to circumvent the unshiftability of prominence. However, it also seems to use a number of cleftlike constructions for the same exact purpose (cf. Lambrecht 1987). A careful analysis of the French data is in order, but if this is indeed the case some additional factor is needed to account for the difference in syntactic encoding between Catalan and French.

11. See Vallduví 1990a for a proposal to provide a unique abstract structural representation of informational meaning for Catalan and English.

## REFERENCES

Baltin, M. 1982. A landing site theory of movement rules. *Linguistic Inquiry* 13.1-38.

Bonet, E. 1989. Postverbal subjects in Catalan. MIT. Unpublished ms.

Bonet, S. & J. Solà. 1986. *Sintaxi Generativa Catalana*. Barcelona: Enciclopèdia Catalana.

Chafe, W. L. 1976. Givenness, contrastiveness, definiteness, subjects, topics, and point of view. In C. Li, ed. *Subject and Topic*. NY: AP. Pp. 25-55.

Chomsky, N. 1971. Deep Structure, Surface Structure, and semantic interpretation. In D. Steinberg & J. Jacobovits, eds. *Semantics*. Cambridge: Cambridge U. Press. Pp. 183-216.

Delin, J. 1990. Accounting for cleft constructions in discourse: A multilayered approach. Research paper HCRC/RP-5. Edinburgh: HCRC.

Gundel, J.K. 1988. Universals of topic-comment structure. In M. Hammond et al., eds. *Studies in Syntactic Typology*. Amsterdam/Philadelphia: John Benjamins. Pp. 209-239.

Halliday, M.A.K. 1967. Notes on transitivity and theme in English (Part II). *Journal of Linguistics* 3.199-244.

Horne, M.A. 1988. Toward a quantified, focus-based model for synthesizing English sentence intonation. *Lingua* 75.25-54.

Horvath, J. 1986. *FOCUS in the Theory of Grammar and the Syntax of Hungarian*. Dordrecht: Foris.

Jackendoff, R. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge: MIT Press.

Kiss, K.É. 1981. Structural relations in Hungarian, a 'free' word order language. *Linguistic Inquiry* 12.185-213.

Kuno, S. 1972. Functional Sentence Perspective. *Linguistic Inquiry* 3.269-320.

Kuroda, S.-Y. 1972. The categorical and the thetic judgment. Evidence from Japanese syntax. *Foundations of Language* 9.153-185.

Lambrecht, K. 1987. Sentence focus, information structure, and the thetic-categorical distinction. *BLS* 13.366-382.

Prince, E.F. 1986. On the syntactic marking of presupposed open propositions. *CLS (Parasession)* 22.208-222.

Reinhart, T. 1982. Pragmatics and linguistics: An analysis of sentence topics. *Philosophica* 27.53-94.

Rochemont, M. 1986. *Focus in Generative Grammar*. Amsterdam/Philadelphia: John Benjamins.

Rochemont, M. 1989. Topic islands and the Subjacency Parameter. *Canadian Journal of Linguistics* 34.145-70.

Sasse, H.-J. 1987. The thetic/categorical distinction revisited. *Linguistics* 25.511-580.

Schmerling, S.F. 1976. *Aspects of English Sentence Stress*. Austin: University of Texas Press.

Selkirk, E. 1984. *Phonology and Syntax*. Cambridge: MIT Press.

Sgall, P., E. Hajičová & J. Panevová. 1986. *The Meaning of the Sentence in its Semantic and Pragmatic Aspects*. Dordrecht: Reidel.

Välimaa-Blum, R. 1988. *Finnish Existential Clauses: Their Syntax, Pragmatics, and Intonation*. Ohio State University Ph.D. Dissertation.

Vallduví, E. 1990a. Information Structure: The pure representation of informational meaning. Paper presented at 1990 GLOW, Cambridge-London.

Vallduví, E. 1990b. *The Informational Component*. University of Pennsylvania Ph.D. Dissertation.

Ward, G. 1985. *The Semantics and Pragmatics of Preposing*. University of Pennsylvania Ph.D. Dissertation.

ESCOL '90 307-319

# A UNIFIED EXPLANATION OF DEPONENT VERBS IN ANCIENT GREEK

Lindsay Whaley
State University of New York/Buffalo

One salient property of Ancient Greek grammar is a relatively intricate system of verbal morphology. Various affixes, often operating in tandem with stem modifications, signal person, number, tense/aspect, mood, and voice (1a-d).[1]

| | | | | |
|---|---|---|---|---|
| (1)a. | *leip-s-o:*<br>leave-FUT-1S | 'I will leave' | b. *e-leiph-the:n*<br>AOR-leave-PASS:AOR:1S | 'I was left' |
| c. | *le-loip-enai*<br>PFT-leave:PFT-INF | 'To have left' | d. *lip-oi*<br>leave:AOR-3S:OPT | 'He might leave' |

The examples provided in (1) comprise only a modest portion of a verbal inflectional system that exhibits over seventy permissible inflectional combinations. However, this fragmentary representation of the system does illustrate the sometimes complex ways in which affixes interact with other affixes and with verb stems. For instance, a comparison of (1b) and (1d) reveals that the stem diphthong is shortened for the aorist optative form, but not for the aorist passive form. Moreover, while the optative does not require an aorist augment, the indicative verb does. (1c) depicts a process of reduplication that is unique to the perfect[2]--in this example, it must be accompanied by yet another stem alternant.

Although Ancient Greek verbs are typically found to display the full range of possible amalgamations of these categories, a rather glaring deficiency marks the paradigms of a significant number of verbs, the so-called "deponents". While deponent verbs pattern regularly in most ways, they lack an active form; consequently, they necessarily appear with middle/passive morphology--even when they carry an active meaning (2).

| (2) | | | | |
|---|---|---|---|---|
| | *keimai* | 'I lie (down)' | *geuomai* | 'I taste' |
| | *hallomai* | 'I well up' | *epistamai* | 'I understand' |
| | *poreuomai* | 'I go' | *eklanthanomai* | 'I forget' |
| | *kathe:mai* | 'I sit' | *bdelussomai* | 'I detest' |
| | *politeuomai* | 'I conduct myself' | *kauchaomai* | 'I pride myself' |
| | *deomai* | 'I beg' | *o:neomai* | 'I buy' |

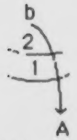
A cursory look at this list suggests that the deponent verbs are a very disparate group. Some of them are transitive, but others intransitive. Some denote volitional activity, some non-volitional activity, and others psychological processes. In many ways, the list appears to be largely ad hoc.

In this paper, I argue that membership in the class of deponent verbs exemplified in (2) is not arbitrary, but is defined by a common syntactic property. Specifically, using the multistratal conception of syntax provided by Relational Grammar (RG), it is shown that deponent verbs in Koine Greek[3] head clauses that contain a 2/1-NOMINAL (3).

(3)a. 2/1-NOMINAL (definition, Whaley 1990a):

A nominal node, A, is a 2/1-NOMINAL of clause b if and only if:
i) it heads a 2-arc with tail b, and
ii) it heads a 1-arc with tail b in the final stratum.

b.



The simplest type of 2/1-NOMINAL is depicted in (3b), where the nominal A initially holds the 2-relation and advances directly to subject in the following stratum. However, the definition of a 2/1-NOMINAL subsumes several more complex relational structures.

Before focusing directly on the issue of deponent verbs, attention is turned to the function of middle/passive morphology in clauses headed by verbs with unrestricted paradigms. Delimiting which clause types employ middle/passive morphology for such verbs provides the foundation for the central claim of this paper that middle/passive morphology marks the presence of a 2/1-NOMINAL.

## I. Regular Uses of Middle/Passive Morphology

### I.A. Passive

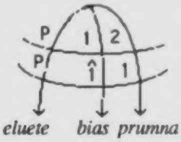
In terms of textual frequency, the dominant application of middle/passive suffixes in Koine Greek is to indicate a passive clause. Not surprisingly, in examples of passive in Koine texts (4a-b), subject agreement is with the nominal which holds the semantic role of patient, while the agent nominal is flagged by a preposition, *hupo* (if the agent is expressed at all).

(4)a. *he de prumna e-lu-eto hupo te:s bias*
the pcl stern AOR-loose-M/P:3S by the force
The stern was broken to pieces by [the pounding of the surf].

b. *ouranoi puroumenoi lu-the:s-ontai*
heavens burning loose-FUT:PASS-3P
The heavens being on fire will be dissolved.

Perlmutter and Postal (1983, 1984) have proposed that simple passive clauses like these involve a bistratal syntactic structure universally. The transitive initial stratum contains a nominal heading a 2-arc that is promoted to the subject relation, placing the initial 1 en chomage (5).

(5)



Adopting this representation allows for straightforward generalizations about case marking and verb agreement (6).

(6) The final 1 (of a finite clause) is assigned nominative case.
Verbs agree in person and number with the final 1 (of a finite clause).

This brief review of passive generates the uncontroversial claim that middle/passive voice is in some way reflecting the displacement of the logical subject by the logical object. Moreover, while the morphology could conceivably indicate a number of different aspects of passive clauses (e.g. the entire clause or one of its components such as the presence of a 1-chomeur), the set of potential motivations for the use of middle/passive inflection has been significantly reduced. The possibilities are further narrowed in the next section where reflexive clauses are examined.

### I.B. Reflexive

Ancient Greek utilizes two types of reflexive clauses. The first type crucially involves the use of an overt pronoun (7).

(7) *emphanis-o: auto: emauton*
manifest-1S him:DAT myself:ACC
I will show myself to him.

In (7), it is the direct object which is coreferent with the subject. However, the reflexive pronoun can bear a wide array of thematic roles including comitative, recipient, benefactor, and locative (see Whaley 1990a for examples).

The second way that Ancient Greek marks a reflexive clause is with middle/passive morphology. A verb, like *pariste:mi* 'I present' (8a), can be made reflexive by the addition of a middle/passive suffix (8b).

(8)a. *paraste:-s-ei moi arti pleio: do:deka legio:nas anggelo:n*
present-FUT-3S me:DAT now more twelve legions:ACC angels:GEN
He will at once put at my disposal more than twelve legions of angels.

b. *pantes gar paraste:-s-ometha to: be:mati tou theou*
all:NOM for present-FUT-M/P:1S the tribunal:DAT of God
We will all present ourselves before God's judgement seat.

The choice of which type of reflexive is used may be lexically specified for some verbs, but for most, either option is grammatical. For example, in (9) *pariste:mi* is found with a reflexive pronoun rather than middle/passive voice as it was in (8b).

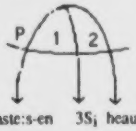
(9) *hois kai pariste:s-en heauton*
whom:DAT also present-3S himself:ACC
...to whom also he showed himself...

The critical observation to be made in comparing (8b) and (9) is that the two types of reflexives are in complementary distribution. That is, either a middle/passive agreement suffix is used or a reflexive pronoun but not both. Presumably, then, (10) is ill-formed.

(10)**pariste:s-ei heauton*
present-M/P:3S himself:ACC
He showed himself.

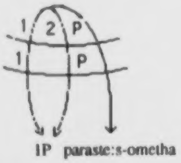
The same morphosyntactic division between two types of reflexive clauses has been described as occurring in other languages as well, e.g. Albanian (Hubbard 1980), Italian (Rosen 1981), and Haustec (Constable 1989). Following the analyses provided for these languages, it is proposed here that the two types of reflexives have significantly different relational structures. Those clauses with an overt pronoun are nothing more than a simple transitive clause (11).

(11)



Unlike reflexives with overt pronouns, reflexive clauses which employ verbal morphology have a single nominal which heads two arcs having the same tail in the initial stratum (12)--that is, the structure involves multiattachment. Furthermore, since morphological reflexives are superficially intransitive in Koine, a cancelation of the 2 occurs.

(12)



A comparison of the passive structure given in (5) in section I.A with that of the reflexive depicted in (12) reveals that the two clause types share the structural feature of having a nominal which heads an initial 2 arc and a 1-arc in the final stratum. This naturally leads to the hypothesis that it is precisely this feature which motivates the appearance of middle/passive morphology. Hence, the following generalization is proposed (13).

(13) Middle/Passive Hypothesis (MPH):
Middle/passive morphology signals a 2/1-NOMINAL.

While this generalization extends to a sizable number of clauses in Koine Greek, there is still a significant number which are potentially problematic for (13). For example, some verbs which display middle/passive agreement carry neither a passive nor a reflexive reading as in (14).

(14) *erch-etai oun eis polin te:s Samareias legomene:n Suchar*
come-3S hence to city of Samaria called Sychar
So he came to a town in Samaria called Sychar.

Even more anomolous and seemingly exceptional is the presence of transitive verbs with middle/passive morphology (15).

(15) *e-geus-ato ho architriklinos to udo:r*
AOR-taste-M/P:3S the feast-master:NOM the water:ACC
The master of the banquet tasted the water.

Counterexamples to the MPH such as these always arise in clauses headed by deponent verbs. In the next section, an examination of the deponents is made to determine whether they truly counterexemplify the MPH or actually support it.

## II. Irregular Uses of Middle/Passive Morphology

All research on Greek deponent verbs over the last century appears to share the methodological assumption that a successful analysis of deponency depends largely on the ability to organize the verbs into sub-classes based on semantic and/or syntactic properties. Indeed, the failure to develop a conventional explanation for deponent verbs results from disagreement over how to clearly identify sub-sets of the verbs which all fall under the rubric of "deponent". Clearly, then, the force of the analysis presented below rests crucially on the ability to explicate attributes of each sub-class of verbs which clearly delimit it from others. Therefore, I have attempted to provide as many characteristic properties as possible by drawing on semantics and on morphosyntactic patterns.

### II.A Intransitive Deponents

The major property which serves to distinguish types of deponent verbs is transitivity. In this section, intransitive deponents are examined. In section II.B an overview of transitive deponents is given.

### II.A.1 Inherent Reflexives

Among the deponents is a small set of verbs whose meanings are inherently reflexive, for example (16).

(16) *ei de ouk egkrateu-ontai...*
if pcl neg control self-M/P:3P
If they cannot control themselves...

Deponent verbs such as the one in (16) do not actually pose any problem for the MPH in that their lack of active form is readily accounted for by the fact that they always carry a reflexive meaning. As reflexives, they have the same relational structure as the regular morphological reflexives (pictured in (12) above). Further examples of inherent reflexives are provided in TABLE 1.

TABLE 1
Inherent Reflexives
(Non-exhaustive)

| | | | |
|---|---|---|---|
| *egkrateuomai* | I control myself | *epiaomai* | I amuse myself |
| *enantioomai* | I oppose myself to | *politeuomai* | I conduct myself |
| *epekteinomai* | I stretch myself out | *huperairomai* | I exalt myself |

In addition to the fact that these verbs always arise with a reflexive sense in texts, they share a common syntactic distribution in that they are not found with superficial direct objects nor do they head passive clauses. Both of these properties follow from the relational structure proposed for morphological reflexives above in (12). Since the subject nominal also holds the direct object relation in the initial stratum, the presence of a different patient nominal is precluded by the Stratal Uniqueness Law (Perlmutter and Postal 1983b).[4] This means that no nominal heading a 2-arc is present to advance to 1.

While the evidence suggests that these verbs do, in fact, form a sub-class of the deponents, there is an additional question that must be answered with regard to the semantic coherence of the verbs. Namely, why is it that these verbs are inherently reflexive while others are not. After all, there is nothing in the semantic composition of the propositions expressed by the verbs listed in TABLE 1 which necessitates their reflexivity. For instance, one could just as easily "exalt another" as "exalt oneself". The answer to this question is at one and the same time lexical and historical.

An examination of the Greek lexicon reveals that the absence of an active form of a verb like *uperairomai* 'I exalt myself' can be explained by the fact that a different lexical item is used to convey the non-reflexive meaning (17).

(17) *hupso:-s-en tapeinous*
exalt-AOR-3S the humble
He exalted the humble ones.

That some verbs are inherently reflexive while other likely candidates are not is simply a consequence of historical processes. At one time the inherent reflexive deponents were most likely part of a full verbal paradigm. In the passage of time, a synonymous lexical item usurped their active forms leaving them as members of the class of deponents.

### II.A.2 Unaccusatives

Another cluster of intransitive verbs which are deponent is the set of unaccusatives. A non-exhaustive list of these verbs is provided in TABLE 2.

TABLE 2
Unaccusatives

| | | | |
|---|---|---|---|
| *aidoumai* | I am ashamed | *penomai* | I am poor |
| *hallomai* | I well up | *poreuomai* | I go, proceed |
| *apothanoumai* | I die | *ptarnumai* | I sneeze |
| *aphikneomai* | I arrive at | *tekomai* | I melt |
| *brimaomai* | I am indignant | *me:kaomai* | I cry |
| *gignomai* | I am born, become | *neomai* | I come, go |
| *erchomai* | I come, go | *pesumai* | I fall |
| *ikneomai* | I come | *o:ruomai* | I roar |
| *kathemai* | I sit | *prothumeomai* | I am eager |
| *keimai* | I lie | *essoomai* | I am inferior |
| *mainomai* | I am insane | *orcheomai* | I dance[5] |
| *optanomai* | I appear | *ginomai* | I become |

There are three individuating properties of these verbs all of which support the hypothesis that they are unaccusatives. First, a preliminary partitioning of the verbs presented in TABLE 2 furnishes three semantic categories which are typically associated with unaccusativity: statives (e.g. *aidoumai* 'I am ashamed' and *mainomai* 'I am insane'); non-volitional activities (e.g.

*hallomai* 'I well up' and *tekomai* 'I melt'); and motion verbs which specify a direction of movement rather than a means of locomotion (e.g. *erchomai* 'I come' and *poreuomai* 'I go'). Although it has been argued that verbal semantics is not an entirely predictive measure of unaccusativity (Rosen 1984), the fact that the verbs under scrutiny so closely match what are considered to be prototypical unaccusative predicates is prima facie evidence for this conclusion.

The second characteristic of the verbs listed in TABLE 2 is morphosyntactic. Whaley (1990a+b) examines a particular case phenomenon in Koine which is sensitive to more than one level of syntactic representation. When an adverbial participle clause has an understood subject which is coreferent with a nominal of a main clause, the participle and its subject (if overt) take on the case of that nominal (18).

(18) *enepaidz-an de auto: kai hoi stratio:t-ai [oksos prospher-ont-es auto:]*
mock-3P pcl him:DAT also the soldiers-NOMP vinegar offer-PRT-NOMP him:DAT
And the soldiers also mocked him...offering him vinegar.

In (18) the understood subject in the adverbial clause (bracketed) is coreferential with the subject of the main clause. Thus, the, participle receives nominative case. However, this pattern of case concord may be violated in certain instances. Specifically, if the subject of the participle in not a PANSTRATAL-1 (19)[6], then case concord is optional.

(19) PANSTRATAL-1 (definition):

A nominal node, A, is a PANSTRATAL-1 of clause b if and only if it heads a 1-arc in all strata of clause b.

Thus, in a passive adverbial clause (20), where the participial subject is not a PANSTRATAL-1 because it holds the direct object relation in the initial stratum, the conditions which require case concord are not met.

(20) *[ekte-th-entos de autou] aneil-ato auton he: thugate:r Pharao:*
expose-PASS-PRT:GENS pcl he:GENS take-3S him:ACC the daughter:NOM Pharaoh:GEN
When he was placed outside, Pharaoh's daughter took him.

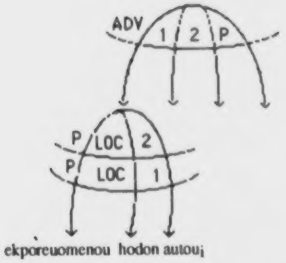
As can be seen in (20), the subject of the participle is not plaçed in accusative case even though it is coreferent with the direct object of the main clause. This is possible only because the subject of the participle holds the 2 relation in the initial stratum rather than the 1 relation.

Since this case phenomenon is sensitive to non-final levels of representation, one expects that the same lack of case concord should be available to the verbs in TABLE 2 that are said to be unaccusative. This is, in fact, what is found (21).

(21) *[kai ekporeu-omen-ou autou eis hodon] prosdra-mo:n heis...epe:ro:ta-o: auton*
and proceed-PRT:M/P-GENS he:GEN to road run-PRT:NOMS one question-3S him:ACC
And when he had gone forth into the way, there came one running...[he] asked him.

The lack of case concord in (21) suggests that the subject of the participle is not a PANSTRATAL 1. This accords well with the position that these verbs are, in fact, unaccusative (22).

(22)



A final property of the unaccusative verbs in TABLE 2 involves quantifier float. While Ancient Greek is renown for having a free word order, there are many limitations on just how free it gets. For instance, noun phrases must generally appear as a unit--i.e., they can not have their various constituents scattered throughout a clause. However, there are some syntactic processes which allow movement of one or more of the NP constituents. One of these is quantifier float. It is found that the quantifiers *pas* 'all' and *holos* 'whole' float, but only when they modify a nominal which holds the 2 relation in the initial stratum.[7] Thus, they can float when they modify a direct object (23), or when they modify the subject of a passive clause (24).

(23) ***ogkon*** *apothemenoi* ***panta***...*trecho:men ton prokeimon he:min ago:na*
obstacle:ACC putting aside all:ACC let us run the before us race
Let us throw off everything that hinders...and let us run the race before us.

(24) ***hole:*** *sugchunnetai* ***Ierousale:m***
whole:NOM confuse-PASS-3S Jerusalem:NOM
All of Jerusalem was thrown into confusion.

Given that quantifier float is sensitive to initial 2-hood, we also expect to find examples of subjects in unaccusative clauses that allow quantifier float. And we do (25).

(25) ***pantes*** *te paregen-onto* ***hoi presbuteroi***
all and came-3P the elders:NOM
And all the elders were present.

The combination of the semantics of the verbs listed in TABLE 2 and the two syntactic phenomena discussed here support the conclusion that these verbs are unaccusative. Thus, they support the hypothesis that middle/passive morphology signals the presence of 2/1-NOMINALS.

Attention is now turned to those clauses which have transitive deponents.

## II.B. Transitive Deponents

As was noted above, the existence of transitive deponents is somewhat unexpected if the MPH is correct. However, it is demonstrated in the following sections that these verbs are fully consistent with the MPH hypothesis.

### II.B.1 Indirect Reflexives

One sub-class of deponents includes transitive verbs that denote an activity in which an agent is acting for his/her own benefit. For example, the literal translation of the predicate in (26) is "he took for himself".

(26) *outos men oun e-kte:s-ato* *cho:rion*
this pcl pcl AOR-acquire-M/P:3S field
The man purchased a field.

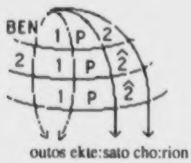
Following Rijksbaron (1984), this set is referred to here as "indirect reflexives". A sample of these verbs is given in TABLE 3.

TABLE 3
Indirect Reflexives

| | | | |
|---|---|---|---|
| *aireomai* | I select | *euchomai* | I pray |
| *amunomai* | I retaliate | *ktaomai* | I acquire |
| *apologeomai* | I make defense | *chraomai* | I use |
| *dechomai* | I receive | *o:neomai* | I buy |
| *deomai* | I beg | *episkeptomai* | I search |

Like both the regular morphological reflexives and the inherent reflexives, it is proposed here that the indirect reflexives involve multiattachment. However, rather than a nominal heading both a 1-arc and a 2-arc, it heads a 1-arc and a BEN(efactive) arc (27).

(27)



The probability that these verbs always take middle/passive morphology because they have a semantic make-up which entails indirect reflexivity has been long noted (Winer 1883, Moulton 1934, Robertson 1914). However, as with the inherent reflexives, there is a question as to why these particular verbs have lexicalized their reflexivity while other verbs have not. And as before, the answer to this question seems to lie in the manner in which the Greek lexicon developed. The active forms of these verbs has been encroached on by different lexical items. For example, in (28) a different verb for acquire which is not inherently reflexive is given.

In addition to the semantic commonality of these verbs, they have similar syntactic distribution in that they do not appear in passive clauses. This observation not only lends support for the claim that the "indirect reflexives" form a subclass of verbs, it also is fully expected given the multiattachment analysis exemplified above.

While there appears to be sufficient reason to recognize these verbs as "indirect reflexives" and as fully consistent with the MPH, a further issue regarding the representation in (27) must be addressed. Specifically, what is the evidence that the 1-arc is multiattached with a BEN-arc instead of a 3-arc?[8] Such evidence is provided by data like (28) which have an overt indirect object.

(28) *euks-aime:n* *an to: theo:* *genesthai*...
pray:SBJ-1S:M/P:SBJ pcl the god:DAT...to become...
I would pray to God that I might become...

The Stratal Uniqueness Law excludes the possibility of having two 3-arcs in any given stratum. Therefore, the presence of the indirect object in (28) necessitates that the multiattachment signalled by the middle/passive morphology be with an initial benefactive.

Again it has been discovered that the MPH is fully compatible with a subset of the deponent verbs that at first glance appear to counterexemplify it. In the next section, the final type of deponent, psych verbs, is reviewed.

### II.B.2 Psych Verbs

The final set of deponent verbs to be discussed are those which express some sort of psychological activity on the part of their subject. A non-exhaustive list of such verbs is provided in TABLE 4.

TABLE 4
Psych Verbs

| | | | |
|---|---|---|---|
| *aisthanomai* | I understand | *pheidomai* | I spare |
| *arneomai* | I deny | *eulabeomai* | I am concerned |
| *proaitiomai* | I find fault | *homeiromai* | I long for |
| *bdelussomai* | I detest | *epimeleomai* | I care for |
| *geuomai* | I taste | *eklanthanomai* | I forget |

In addition to their semantic commonality, these verbs pattern similarily in that they can take a genitive object as in (29).

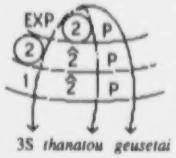
(29) *ou me: geu-s-e:tai thanatou*
neg neg taste-FUT-3S death:GEN
He will in no way taste death.

While the presence of a genitive object is fully grammatical, it is not required. Thus, these verbs may also govern objects in the more typical accusative case (30).

(30) *proe:tia-s-ametha gar Ioudaious te kai Helle:nas*
accuse-AOR-M/P:1P for Jews:ACC both and Greeks:ACC
We have previously accused both Jews and Greeks.

In order to account for the case variability displayed by this class of verbs, it is suggested that they have a relational structure like that in (31).

(31)



Such a structure was first proposed for psych verbs by Gerdts (1989) and Gerdts and Youn (1989) for Korean. For present purposes two aspects of (31) must be highlighted. First, the superficial subject holds an oblique relation in the initial stratum. Primarily for heuristic reasons it is labelled EXP(eriencer) in this diagram. Second, the EXP nominal overruns the initial 2; that is, the it usurps the 2-relation from the initial 2.

Under the condition of overrun (highlighted by circles in (31)), Gerdts has argued that an experiencer may pass its inherent case to the nominal which it overruns. This would account for the case variability found in clauses headed by psych verbs. The 2-chomeur may license accusative case, which is typically found on 2-chomeurs (see Whaley 1990a). Alternatively, the experiencer may pass its inherent (lexical) case to the initial 2 since the conditions for case spread are present and the 2-chomeur will be marked genitive.

While the relational network in (31) is consistent with the data and is appealing in that it supports the MPH, independent evidence is required to motivate the various claims that it entails. Primarily, the assignment of an initially oblique relation to the final-1 needs justification. A surprising bit of supporting evidence for the relational structure proposed in (30) comes from a relatively rare occurrence of psych verbs in clauses where the experiencer does not advance (32).

| | | | | | |
|---|---|---|---|---|---|
| (32) | *ean* | *akous-the:* | *touto* | *epi tou* | *he:gemonos* |
| | if | hear-Pass3S | this:NOM | on the | governor:GEN |

If this [report] is heard by the governor.

In these constructions, the initial 2 advances to subject leaving the experiencer in its oblique form as in (32). The experiencer, which is flagged by a preposition, receives genitive case, exactly what would be expected if the psych verb analysis is correct.

Both the semantics and morphosyntactic patterns of this class of deponents motivate the relational structure proposed in (31). Since this structure contains a 2/1-NOMINAL, the psych verbs, like all the other deponents we have examined, support the MPH.

## III. Conclusion

In this paper, it has been argued that middle/passive morphology signals the presence of a 2/1-NOMINAL. While efforts have been made to demonstrate that this conclusion is applicable to a wide variety of deponent verbs, there are still some clause types that require further investigation which may affect the particular form of the MPH given here. These include deponents which take dative objects (e.g. *embrimaomai* 'I scold') and verbs which are deponent in the future only (e.g. *gino:sko:* 'I know', *akouo:* 'I hear'). Initial research on these two types of deponents indicates that the MPH is a valid rule of Greek grammar, but that it is only a sufficient (and not necessary) condition for determining clauses with a 2/1-NOMINAL.

The primary significance of the conclusions reached in this paper are to Classics studies in that they challenge the long held assumption (more recently defended by Dryer 1982 for Latin) that deponents comprise an arbitrary set of verbs whose only consistently shared feature is their morphological irregularity. However, the paper also contributes to the ongoing debate of how grammatical theory should conceive of syntax and the syntax/morphology interface. Although Greek grammarians displayed tremendous insight in much of their research on deponent verbs, they were ultimately unsuccessful in attaining a unified explanation for the class of deponents because a) they failed to recognize that deponents are not related primarily in terms of semantic content but by a syntactic characteristic and b) they were constrained by a conception of grammar that operates on a single level. These shortcomings are instructive for contemporary linguistics. Finally, this paper is of interest in that it supports the conclusions reached by others that a single morphological category is often used to unify disparate clause types (Barber 1975, Hubbard 1980, Constable 1989).

## Footnotes

1. The following abbreviations are used in the body of the paper: ACC=accusative case; AOR=aorist; DAT=dative case; FUT=future; GEN=genitive case; INF=infinitive; M/P=middle/passive morphology; neg=negative particle; NOM=nominative case; OPT=optative; P=plural; PASS=passive; pcl-particle; PFT=perfect; PRT=participle; S=singular; SBJ=subjunctive; #'s=person.
2. A small class of verb stems still transparently reflect a once productive process of present reduplication as well.
3. Koine, or Hellenistic, Greek was an Attic/Ionic based dialect dominant among Greek speaking peoples from the time of the conquests of Alexander the Great to the fifth or sixth century A.D. While the analysis proposed in this paper is based entirely on investigations of Koine texts, the conclusions probably extend to other varieties of Ancient Greek as well.
4. Perlmutter and Postal (1983b) provide the following formulation of the Stratal Uniqueness Law:

   Let '$\text{term}_x$' be a variable over the class of R-signs, that is, '1', '2', or '3'.

   Then: If arcs A and B are both members of the $c_k$ stratum and A and B are both $\text{term}_x$ arcs, then A=B.
5. The inclusion of certain verbs like *orcheomai* among the unaccusatives may appear to contradict my claim that they have prototypical unaccusative semantics. However, it does not. For example, following Veitch (1871), *orcheomai* is probably best translated: "I am made to dance". The fact that there is not a lexical analog in English adds support to Grimshaw's (1987) suggestion that "cross-linguistic synonimity may be misleading".
6. Gibson and Raposo (1986) employ a similar, if not identical notion "consistent $GR_x$" where they define a consistent $GR_x$ as " a nominal that bears the same [grammatical relation], $GR_x$, throughout all strata of a clause".
7. Some processes of movement overlap. As a result, there are some apparent counterexamples to the restrictions on quantifier float. To avoid confusion, it must be made clear that what I refer to here as quantifier float entail movement of the quantifier so that it is separated from the head noun by the predicate of the clause. Once this is stipulated, no counterexamples (that I am aware of) arise to my claim that the movement is restricted to initial 2's.
8. While they are in no way responsible for the analysis given here, David Perlmutter and Matthew Dryer deserve credit for bringing this issue to my attention.

## References

Barber, E.J.W. 1975. Voice--Beyond the Passive. *Proceedings of the First Annual Meeting of the Berkeley Linguistics Society*, 16-24.

Constable, P. 1989. Reflexives in Vera Cruz Haustec. *Work Papers of the Summer Institute of Linguistics* 33.31-66, University of North Dakota.

Dryer, M. 1982. In Defense of a Universal Passive. *Linguistic Inquiry* 10.53-60.

Gerdts, D. 1989. A Relational Theory of Case. ms.

Gerdts, D. and C. Youn. 1989. Psych Constructions and Case in Korean. ms.

Gibson, J. and E. Raposo. 1986. Clause Union, the Stratal Uniqueness Law, and the Chomeur Relation. *Natural Language and Linguistic Theory* 4.295-331.

Grimshaw, J. 1987. Unaccusatives--An Overview. *Proceedings of the North Eastern Linguistics Society* 17.244-258.

Goodwin, W. and C. Gullick. 1930. *Greek Grammar*. Boston: Ginn Brothers.

Hubbard, P. 1980. The Syntax of the Albanian Verb. San Diego: University of California, dissertation.

Moulton, J. 1934. *A Grammar of New Testament Greek, Vol. 2: Syntax*. Edinburgh: T & T Clark.

Perlmutter, D. 1980. Relational Grammar. In E. Moravcsik and J. Wirth (eds.), *Syntax and Semantics 13: Current Approaches to Syntax*. New York: Academic Press.

Perlmutter, D. and P. Postal. 1984. Impersonal Passives and Some Proposed Relational Laws. In D. Perlmutter and C. Rosen (eds.), *Studies in Relational Grammar 2*, 126-170. Chicago: University of Chicago Press.

Perlmutter, D. and P. Postal. 1983. The Relational Succession Law. In D. Perlmutter (ed.), *Studies in Relational Grammar 1*, 30-81. Chicago: University of Chicago Press.

------------------------------------ 1984. Some Proposed Laws of Basic Clause Structure. In D. Perlmutter and C. Rosen (eds.), *Studies in Relational Grammar 2*, 81-128.

Rijksbaron, A. 1984. *The Syntax and Semantics of the Verb in Classical Greek: An Introduction*. Amsterdam: J. C. Grieben.

Robertson, A. T. 1914. *A Grammar of the Greek New Testament in Light of Historical Research.*. New York: Hodder and Stought.

Smyth, H. 1920. *Greek Grammar*. Cambridge: Harvard University Press.

Veitch, W. 1871. *Greek Verbs: Irregular and Defective*. Oxford: The Clarendon Press.

Whaley, L. 1990a. The Circumstantial Participle Construction in Ancient Greek. MA thesis, State University of New York at Buffalo.

------------- 1990b. The Effect of Non-surface Grammatical Relations on the Genitive Absolute in Koine Greek. To appear in *Grammatical Relations: A Cross-Linguistic Perspective Proceedings of the 5th Biennial Conference on Grammatical Relations.*

ESCOL '90 320-331

# INTONATION AND FOCUS IN AMERICAN SIGN LANGUAGE*

Ronnie Wilbur
Purdue University

This paper attempts to cover many topics in a small amount of space, ranging from sign physics, phonetics, and phonology to sign syntax. The following street map may prove helpful. There are two main goals - to integrate existing information into a coherent form regarding ASL intonation and to provide new information on intonation, focusing, and ASL syntax. In the process, I will provide a sketch of sign production, another sketch of the modifications that signs undergo for purposes of stress or phrasal rhythm, and a discussion of the role of nonmanual characteristics (facial expression, head nod) in ASL intonation. I will suggest that one of the functions of the head nod is to mark focus. I will introduce ASL pseudocleft constructions and argue for their analysis as single sentences parallel to predicate nominals with sentential subjects. I will observe a similarity between ASL and Russian insofar as both move words into initial position for topic and final position for focus (as opposed to English, which moves the accent or uses elaborate syntactic constructions). I will explore the notion "analogue to pitch" which frequently arises in discussions of ASL intonation, and I will raise a few unanswered questions as well.

A word of caution before proceeding: we frequently find a strong temptation among researchers to study ASL by approaching the endeavor as a matter of analogies to spoken languages. Such an approach must be conducted carefully. I will continue here, as I have with all my research on ASL, by assuming that function is the basis for deciding such parallels - I will assume that if it can be demonstrated to act in all relevant respects like a duck but fails to quack, it can be classified as a duck. On this basis, I feel comfortable talking about ASL intonation and focus.

I will note below how ASL intonation functions like spoken intonation. In addition to stress and rhythm, intonation is marked by several ASL nonmanual characteristics which are specified at the phrasal level and which serve to indicate phrasal integration (binding words into phrases and separating phrases from each other) (cf. Ladd 1990). I will assume that the function of focus is to highlight one item from a set of possible items and will concentrate on how the focused item is treated with respect to word order and "head nod" once it has been selected.

## Basic Concepts of Sign Production

The basic formation of signs involves movement arising from changes in handshape, location, or hand orientation, or certain combinations thereof. If a sign has two such changes, one must be a change of location. There is then a hierarchy of movement importance - treated by Sandler (1987) as an indication of hierarchical structure on a feature tree and by Corina (1990) as evidence of differing sonority.

There are a number of possible manners of production (size, speed, shape, manner), some of which are used lexically and others of which are reserved for morphological purposes (primarily inflectional; cf. Klima and Bellugi 1979). Both size and speed have a default "normal" setting for each conversation/utterance, which can then be manipulated to "lots more" (larger, faster) and "lots less" (smaller, slower). Shape can be straight, circle, arc, or look like the number 7 (horizontal then downward vertical). There are additional manners, including whether the sign is made with one or two hands, whether the hands move together or alternatingly, whether the articulation is significantly tense or lax, and whether the movement is reduced and rapidly oscillating. When the manners of production are combined with the changes in location, handshape, or movement (or combinations thereof), a substantial number of distinctive sign movements become available (Wilbur 1990a).

Sign language production is multi-channeled. Significant linguistic information is carried by facial expression, head and body position, and body movement, all of which contribute to prosodic structure. "Facial expression" is actually a conglomeration of different facial parts, each of which has a different range of positions and functions. Liddell (1978, 1980) identified a number of mouth (cheek, chin, tongue) positions which served adverbial or adjectival functions. For example, one glossed "mm" (with corners of the mouth turned down) is used for "easily", while puffed cheeks are used adjectivally for "big". The nose is used in evaluative ways, as for example when it is wrinkled for "dislike". Eye gaze is used for pronominal reference, establishing indexes for nouns and referring back to them in subsequent discourse. Eyebrows are used distinctively in questions, with the "up" position for yes/no questions and the "down" position for Wh-questions. The head may be tilted up/back for topics and topicalization, forward/sideward for questions, and may nod downward for functions to be discussed extensively below.

While a mouth position might be held only for the duration of the lexical item (noun or verb) it modifies, the eyebrow or head position might be held for the entire duration of the sentence; thus the domains vary and certain parts may be changing during a phrase or sentence while other parts are held constant.

## Prominence - Stress and Rhythm

Although it has been claimed that ASL has lexical stress, stress is not in fact distinctive. First, a substantial number of the lexical signs are monosyllabic (Coulter 1982). Second, there are no contrasting forms for any of the multisyllabic categories (Wilbur 1990a). There are three possibilities for lexical items with more than one syllable - disyllables with equal prominence on both syllables, compound disyllables with prominence on the second syllable, and lexicalized reduplicated forms with prominence on the odd-numbered syllables. However, there are no multisyllabic forms with prominence on the even-numbered syllables, or disyllables with prominence on the first (but not the second) syllable. No lexical or morphological distinctions depend entirely on prominence.

ASL has both emphatic and contrastive stress. However, there is no "normal sentence stress", in the sense of being able to predict a sentence stress location by any obvious generalization or rule when emphasis, contrast, and focus are held constant. The reason for this will become clearer when focus and word order are discussed below. There are also no obvious stress clash or stress shift rules, although there is a strong tendency to maintain alternating accent, which is accomplished most often by insertion of unaccented transition syllables.

Stress is marked by a variety of cues: 1) adding a change of location to signs which do not ordinarily have one (if Corina's 1990 analysis of ASL sonority is correct, this increases the sonority of the syllable), 2) moving a sign higher in the signing space (conceivably an increase in amplitude), 3) repetition (an increase in duration), 4) change of speed (can increase or decrease duration), and 5) increased tension (an expected part of stress in any modality) (Wilbur and Schick 1987). Although the nature of ASL rhythm has not been fully established (more below), it is clear that a rhythmic pattern is created and that the body itself contributes to this pattern, moving in time with the hands. To increase the salience of a stressed sign, the rhythmic pattern that has been established is broken (Wilbur and Schick 1987; Wilbur 1990b,c). This is accomplished by a combination of cues, including changing the duration of the sign, modifying the transition prior to the stressed sign (increased velocity, decreased duration), and pausing after the stressed sign (from 150 msec to more than a second).

It is clear that ASL, as a naturally occurring language, has a rhythmic structure of its own. Inappropriate use of rhythm is cited by native signers as one of the best clues to identifying non-native signers (Kantor 1978). The problem is to determine what the proper rhythmic structure is.

Certain characteristics of ASL rhythmic structure are already well-studied. Among these are the duration changes that occur when signs are put into phrases and sentences. Liddell (1978) noted that the shortest average sign durations occur when signs are in phrase-medial position (233 msec). If the initial sign in a phrase is topicalized or is the head of a relative clause, the mean sign duration rises to 600 msec. Wilbur and Nolen (1986) reported that syllables in signs in phrase-final position averaged over 100 msec longer than those which were not in phrase-final position. More recently, Wilbur (1990c) confirmed that the duration of lexical items is affected by both sentence position and by stress, with signs longer in sentence-final position than in medial position and stressed signs significantly shorter in duration than their unstressed counterparts. When these two factors are combined, there is a significant interaction, with the result that stressed signs in final position are longer than unstressed signs, but stressed signs in sentence-internal position are shorter than their unstressed counterparts.

Size, on the other hand, is not a significant phonological variable, at least not as far as rhythmic structure is concerned. Klima and Bellugi (1979) have demonstrated the significant relationships that exist between morphological inflections in ASL and the size of the signing path. Both Poizner, Newkirk, and Bellugi (1983) and Wilbur (1990b,c) have demonstrated that absolute size (as reflected by extent of displacement) is not significant in general sign production nor in stressing signs.

Besides duration and displacement, another significant characteristic of sign formation and rhythmic patterning is velocity. Velocity of transitions is faster before signs in sentences than signs in isolation, faster before sentence-final signs than before sentence-medial signs, faster before sentence-medial signs than before signs in isolation, and faster before stressed signs than before unstressed signs (Wilbur 1990c). The velocity of lexical items in sentence-medial position is nearly twice that in sentence-final position, and non-final stressed signs are 2.7 times faster than unstressed signs.

From the perceptual side, prominence and rhythm have received much less attention. In a tapping study of ASL rhythm, native deaf, native hearing, and sign-naive hearing subjects all tapped more frequently to signs that were repeated (reduplicated), stressed, and/or phrase-final than to those that were not (Allen, Wilbur, and Schick in review). However, the sign-naive hearing group tapped as much to signs with secondary stress as to signs with primary stress, while the two native-signer groups tapped more often to signs with primary stress than to signs with secondary stress. Either a) primary and secondary stress are distinguished in subtle ways that are not visually apparent (and therefore they are not salient to the sign-naive group), or b) the difference between primary and secondary stress in ASL is a matter of grammatical determination rather than physical determination (that is, both types are stressed in roughly the same physical ways and they can be distinguished only with the assistance of information such as phrase structure). However they are distinguished, native signers clearly know the difference.

## Intonation and focus

As background to the discussion of intonation and focus, several details concerning the use of nonmanual markers and word order need to be established. First, it is important to be clear that while nonmanual markers (facial expression, head and body position) are used for both syntactic and affective purposes, the difference is that syntactic nonmanual markers turn on and off with the constituents they modify, while affective nonmanual markers turn on and off gradually and not necessarily at syntactic phrase boundaries (Liddell 1978, 1980). In ASL, the negative headshake is grammatical and is turned on and off abruptly at constituent boundaries; negative headshakes used by hearing speakers of English are turned on and off gradually and in positions seemingly unconnected with English syntactic structure (Veinberg and Wilbur 1990).

Second, as indicated earlier, the nonmanual markers comprise a number of independent channels - head position, body position, eyebrow and forehead position, eye gaze, nose position, and mouth and cheek shape. The lower part of the face tends to produce meaningful markers that associate with specific lexical items or phrases with those lexical items as heads (i.e., noun or noun phrase, verb or verb phrase). Indeed, the lower face markers are deemed adjectival if they co-occur with nominals but adverbial with predicates. By contrast, the eyebrow/forehead and head positions co-occur with higher syntactic constituents (clauses, sentences), even though such constituents could contain only a single sign (e.g., a topicalized noun or verb). Thus it is possible (indeed common) to get a lower face nonmanual marker embedded inside the domain of an upper face nonmanual marker (which is equivalent to making the unremarkable observation that an adverb or adjective can occur inside a sentence or question). Ladd (1990) suggests that the domain of pitch in spoken languages is determined by lexical items for tone marking and by larger phrases for intonation marking. Similarly, in ASL, lexical items or their projections determine the domain of lower face nonmanual markers while phrases (clauses, sentences) determine the domain of upper face nonmanual markers. This would make the upper face markers the functional equivalent of spoken intonation. There are, however, two differences in this parallel - first, Ladd is referring to different languages when he specifies where the domain of pitch is determined, while we are referring here to a single language, and second, Ladd can speak directly of the domain of pitch, a single feature of the speech stream, while we are referring here to at least two separate clusters of facial features, upper and lower face, each of which contains more than one contributing (but coordinated) articulator. Further functional evidence will be given below.

Third, ASL has both phonological and syntactic means of indicating that an item is focused. There is a specific nonmanual marker - the head nod ("hn") - which I believe is used for phonological marking of focus. According to Liddell (1980), "hn" is used to mark nouns in gapping constructions and in predicate nominal constructions, both of which result in NN sequences, with "hn" on the second N. Thus, in a gapping sentence such as "John painted the chair, Mary the table, and Bill the window," there should be "hn" on table and window. In the predicate nominal, there is a "hn" on DOCTOR in the sequence JOHN DOCTOR, when it means "John is a doctor". By contrast, no "hn" is present when the sequence means "John's doctor." Liddell also suggests that "hn" behaves parallel to English "be" or "do", especially in its function when the main verb is missing, and for emphasis ("John DID go to the movies").[1]

These claims deserve further examination. Additional data come from constructions wherein subjects which are stranded by topicalization ("t") of the verb and object also receive a required "hn", as illustrated in (1) (English in quotes, ASL in caps) (Liddell, 1980). As example (2) shows, this "hn" does not occur on subjects which appear in the same clause as their predicates.[2] The "hn" on the stranded subject in example (1) could be interpreted as parallel to the above two uses - missing the main verb (which is in the preceding clause) and emphasis (as suggested by the English translation with "did"). The absence of "hn" in example (2) lends credence to the missing main verb function of head nod, since the main verb is now in the same clause as the subject and therefore no "hn" is used. However, it cannot be maintained that the function of "hn" in sentences like (1) is emphasis, because example (2) is parallel in all relevant respects but no "hn" is used (for reasons that are not yet clear). The function of "hn" in focusing will be discussed further below.

(1) ______t ___hn
WASH CAR JOHN "as for washing the car, John did it"

(2) ___t
CAT DOG CHASE "as for the cat, the/a dog chased it"

Fourth, syntactic focusing is accomplished by changing word order. One type of syntactic focusing in ASL is topicalization. Possible topicalizations are 1) S,VO 2) O,SV 3) OV,S and 4) VO,S. In each case, there is a pause (rhythmic break) after the topicalized constituent (indicated in the examples by a comma), and a head tilt and special mouth position (called "ee", Coulter 1982) only on the highlighted item. Preposing is used for those items not already in initial position (but see further qualification below). Example (1) illustrates a topicalized VO,S construction, while (2) shows topicalization of the object.

There is still controversy surrounding the basic word order in ASL, although recent work argues forcefully for SVO (Fischer, 1990). In environments in which word order is restricted (e.g., yes/no questions), the word order is SVO (Liddell, 1980). With classifiers and locatives, the word order is OSV. SOV occurs frequently when the verb is inflected for both subject and object. Word order is also affected by possible verb agreement for object, subject, or both (Fischer 1975; Kegl 1976; Liddell 1980).

Because ASL allows relatively free word order, it is able to shuffle signs in accordance with such principles as "topicalized item is sentence initial" (but special nonmanual markers are required). Other principles (with no special nonmanual markers needed) include "topic/given information is sentence initial" and "focus/new information is final." In this regard, ASL is like

Russian. Comrie (1990) discusses at length the determination of Russian word order in accordance with similar principles - topic initial, focus final. This differs from English, which puts subject first and uses stress shifting or elaborate syntactic structures (passive, clefting, pseudoclefting) to adjust word order to accommodate focus. Examples (3) and (4) both translate "John painted the chair." (The sign glossed PT is the pointing gesture that establishes an index for CHAIR, making it definite. The sign glossed SELFG is an animate, specific index for John.)

(3) CHAIR PT JOHN SELFG PAINT (OSV; CHAIR is 'given')
(4) JOHN SELFG PAINT CHAIR PT (SVO; JOHN is 'given')

Note the absence of special nonmanual markers; although adjectival or adverbial facial expressions could be added to modify CHAIR or PAINT, no nonmanual markers are specified by the phrase or sentence level. This contrasts with the topicalized (5) (PT is not required because topics are, by definition, definite):

(5) ____t
CHAIR JOHN SELFG PAINT
chair-topic John himself paint

Syntactic focusing parallel to English pseudoclefts is accomplished with a "rhetorical question" followed by the focused item (Fischer 1990 calls them "free relatives"). Rhetorical questions have the syntactic structure of Wh-questions, but the nonmanual markers associated with yes/no questions (raised eyebrows) instead of Wh-questions (lowered eyebrows) (Baker-Shenk 1983). Also present are the "lean forward" and "head tilt" normally associated with questions.

(6) ____________rhq ______hn
JOHN PAINT WHAT? CHAIR PT
"What John painted was the chair."

(7) _________________rhq _______hn
CHAIR (PT) PAINT WHO? JOHN SELFG
"Who painted the chair was John."

(8) ______rhq ________hn
JOHN DO+++ CHAIR PAINT
"What John did was paint the chair."

Example (6) shows the pseudocleft which focuses CHAIR (of the set of possible things which John might have painted, the one he actually painted was the chair). Note that CHAIR is in final position rather than initial position (cf. the topicalized form) and that CHAIR has "hn" because it is focused (it is not a stranded subject). In example (7), JOHN has "hn" because it is focused and also because it is a stranded subject. Example (8) is interesting in several respects. The rhetorical question "What did John do?" does not require an overt Wh-sign for "what": the verb form DO+++ (repeated DO) is frequently used alone to ask "what are you doing?", "what did he do?", "what am I going to do?" and seems to imply the Wh-word - in fact, they appear to be mutually exclusive. Also, the entire phrase CHAIR PAINT is within the domain of "hn" - similar sentences with "hn" only on PAINT were rejected as unacceptable. As for the interpretation of "hn" here, it must be focus, as CHAIR PAINT is not a stranded subject.

A closer look at the structure of the pseudocleft suggests an additional interpretation for the function of "hn". As indicated earlier, "hn" is required on the second N in NN constructions (predicate nominals). The pseudocleft structure can be seen to parallel the NN construction if the rhetorical questions are regarded as sentential subject nominals. First, Wh-rhetorical questions cannot stand alone in ASL - it is obligatory that they be answered by the person who asks them. Further, the answer is constrained to include only the information requested by the Wh-sign. If the answer contains more than one sign, all of them will be included in the domain of the focusing "hn". By contrast, if these were free-standing question - answer pairs, the domain of "hn" (if indeed one were present) would be restricted to only one part of the answer (e.g., would occur on PAINT in CHAIR PAINT). Also, embedding pseudoclefts into "I think that ..." results in another constraint such that the sign for "I think" can either precede the entire pseudocleft or follow it, but cannot come between the rhetorical question and the answer (nor can anything else). In free-standing question - answer pairs, one could start the answer with "I think". In the pseudocleft constructions, the rhetorical question and focused answer behave as a single sentence of the form "what X did = Y", parallel to the predicate nominal constructions (e.g. "John = doctor"). And like the predicate nominal constructions, the "hn" goes on the second constituent. It remains to be determined whether a) "hn" in the predicate nominal is present because of the absence of the main verb (which is a copula; ASL is again like Russian in this respect, at least for the present tense), b) "hn" in the predicate nominal is focusing the predicate (second) nominal, c) there are two "hn" functions which happen to overlap, and/or d) other. Nonetheless, there appears to be strong support for claiming that ASL has sentential subjects, as evidenced by these pseudoclefts.

## More Issues (and answers?)

One frequently asked question about ASL intonation is whether there is an analogue to pitch, with facial expression usually suggested as the primary candidate. In functional terms, those aspects of facial expression and head position which occur over phrasal domains are the closest analogue to pitch when it is used to signal syntactic intonation. These nonmanual signals mark phrase boundaries with their onsets and offsets (although there are other markers, such as velocity decrease and possibly vertical drop which mark boundaries also). They also serve an integrating function, tying the signs in their domains into phrases, and separating phrases from each other (again, there are other markers, such as pausing and transition modifications, which provide phrasal information.)

In physical terms, the differences in modality require such analogies to be tempered by caution. Pitch is unidimensional, relying exclusively on F0. Facial expression, however, can be subdivided into forehead and eyebrow position, eye gaze, eye blink, nose, mouth, and cheeks, plus head position. As observed above, for syntactic purposes the face divides into the lower portion, with smaller domains (lexical items, noun phrases), and the upper portion, with larger phrasal and sentential domains. To be more careful in our analogy, we would have to say that, based on their specification at the phrasal and sentential level and their phrasal marking and integrating functions, the closest analogues to pitch used for intonational purposes would be head position, forehead and eyebrow posture, and possibly eye gaze-all in the upper portion of the head/face. Thus there may be as many as three independently operating channels in the ASL case, but only fundamental frequency in the spoken language case.

Another question concerns whether there are mechanisms for focusing an item which is not in initial or final position. I do not know of any at this time. Highlighted constituents are sentence-initial when topicalized, while the constructions equivalent in meaning and function to pseudoclefts result in focused constituents in sentence-final position. Being a relatively free word order language with differing possibilities for subject and/or object agreement on the verb, ASL can relatively freely move items into these positions, whereas English, with its more rigid word order, can 1) move the accent onto the focus item, 2) move the focus item to initial position by passive in a variety of lexically governed situations, or 3) surround the focus item by focusing syntax, such as "it was X who/which did Y" or "what X did was Y".[3]

Are there recurring intonation patterns in ASL? Clearly there are - the intonation patterns for topicalization, rhetorical questions, yes/no questions, wh-questions, and the pseudoclefts are well-documented. Sequences of head and eyebrow positions in topicalization and pseudoclefts mark the different clauses, while a single head and eyebrow position is used across an entire question, whether yes/no, wh, or rhetorical. These intonation patterns integrate signs into phrases, mark phrasal boundaries, and enable items in focus positions to be given prominence, especially through the use of head nods.

Are there sequences of markers that cross channels? So far, sign researchers have only looked at each channel separately or the co-occurrence across channels at a given point in time, but not at the possibility of patterns which involve different timing in more than one channel. For example, are there patterns which involve a head position followed by a mouth position? Each of the sequential patterns discussed here involves a head position (with accompanying eyebrow and possibly mouth positions) followed by another head position: 1) topicalization involves head tilt up or back followed by head tilt to unmarked position, and 2) pseudoclefts involve head tilt for the rhetorical question part followed by head nod for the focus part. Do sign languages have constraints against crossing non-manual channels?

In summary, focusing in ASL is accomplished by both phonological and syntactic means. Head nods can apparently be used only in sentence-final position. Topicalization involves the phonological markers of head position, mouth position, and rhythmic break as well as the preposing of highlighted items not already in initial position. Pseudoclefts can be translated by a rhetorical question, generally including a wh-sign, followed by the focused item in final position, with a required "hn" on that item. Like Russian, ASL moves the focused item in preference to moving the accent. ASL can focus a constituent larger than a single grammatical category as evidenced by the "hn" on the constituent CHAIR PAINT. And, finally, while there is no single clear analogue to pitch, there are several physical markers that signal intonation patterns, and serve comparable phrasal marking functions (head position, eyebrow/forehead posture, and possibly eye gaze).

## *ACKNOWLEDGEMENTS

Special thanks to Bob Ladd, Susan Fischer, Jeff King, Monica Macaulay, Joe Salmons, and Peter Bjarkman for helping me to formulate and answer the questions discussed herein. The opinions expressed here do not necessarily reflect their views, and they are, of course, absolved of responsibility for any errors.

## FOOTNOTES

1. My own data contradict these statements. With the verb PAINT, the object (CHAIR, TABLE, WINDOW) tends to precede. I have examples with no "hn" at all (TABLE MARY), "hn" only on the second noun (WINDOW BILL), and "hn" over the entire phrase (CHAIR JOHN), with the latter most frequent. Further, my data show the sequence DOCTOR JOHN with "hn" on JOHN for "John is a doctor" rather than JOHN DOCTOR with the "hn" on DOCTOR.

2. DOG is definite if it has been indexed into a spatial location which can serve as an agreement marker (definite); otherwise it is indefinite.

3. Susan Fischer (p. c.) has suggested an ASL translation of the cleft construction "It was the boy who kicked the ball, not the girl" using a form of the sign THAT (THAT-c):

THAT-c BOY (stressed) KICK BALL, NOT GIRL (stressed)

These remain to be investigated further.

## REFERENCES

Allen, G.D., R. Wilbur, and B. Schick. In review. Aspects of rhythm in American Sign Language. *Sign Language Studies*.

Baker-Shenk, C. 1983. *A Microanalysis of the Nonmanual Components of Questions in ASL*. Ph.D. dissertation, UCalif., Berkeley.

Comrie, B. 1990. *Universals of Language and Linguistic Typology.* Chicago: University of Chicago Press.

Corina, D. 1990. Reassessing the role of sonority in syllable structure: Evidence from a visual gestural language. CLS 26.

Coulter, G. 1979. *American Sign Language Typology*. Ph.D. dissertation, University of California, San Diego.

Coulter, G. 1982. On the nature of ASL as a monosyllabic language. Linguistic Society of America, San Diego.

Fischer, S. 1975. Influences on word order change in ASL. In C. Li (ed.) *Word Order and Word Order Change*. Austin: UTexas Press.

Fischer, S. and R. Johnson. 1982. Nominal markers in ASL. Linguistic Society of America, San Diego.

Fischer, S. 1990. The head parameter in ASL. In W. Edmondson and F. Karlsson (Eds.) *SLR'87: Papers from the Fourth International Symposium on Sign Language Research*, 75-85. Hamburg: SIGNUM.

Green, K. 1984. Sign boundaries in American Sign Language. *Sign Language Studies*, *42*, 65-91.

Kantor, R. 1978. Identifying native and non-native signers. *Communication and Cognition*, *11*, 39-55.

Kegl, J. 1976. Relational grammar and American Sign Language. Unpublished manuscript, MIT.

Klima, E. and U. Bellugi. 1979. *The Signs of Language*. Cambridge, MA: Harvard University Press.

Ladd, D. R. 1990. Introduction to Intonational Phonology. University of Edinburgh Department of Linguistics Occasional Paper No. 1 (to appear in G. J. Docherty and D. R. Ladd (Eds.) *Gesture, Segment, Prosody: Papers in Laboratory Phonology II*. Cambridge: Cambridge University Press).

Liddell, S. 1978. An introduction to relative clauses in ASL. In P. Siple (ed.) *Understanding Language through Sign Language Research*, 59-90. New York: Academic Press.

Liddell, S. 1980. *ASL Syntax*. The Hague: Mouton.

Poizner, H., D. Newkirk, and U. Bellugi. 1983. Processes controlling human movement: Neuromotor constraints on ASL. *Journal of Motor Behavior*, *15*, 2-18.

Sandler, W. 1987. Sequentiality and simultaneity in ASL Phonology. Ph.D. dissertation, University of Texas, Austin.

Veinberg, S. and R. Wilbur. 1990. A linguistic analysis of the negative headshake in ASL. Sign Language Studies, 68, 217-244.

Wilbur, R. 1990a. Why syllables? What the notion means for ASL research. In S. Fischer and P. Siple (eds.), Theoretical Issues in Sign Language Research, 81-108. Chicago: UChicago Press.

Wilbur, R. 1990b. An experimental investigation of stressed sign production. International Journal of Sign Language, 1, 41-59.

Wilbur, R. 1990c. The effects of context, sentence position, & stress on sign duration, displacement, & velocity. Ms, Purdue.

Wilbur, R. In press. Segments and syllables in American Sign Language phonology. In G. Coulter (ed.), Theoretical Issues in Sign Language Phonology. New York: Academic Press.

Wilbur, R. and G.D. Allen. In review. Modality effects on syllable perception in ASL. Language and Speech.

Wilbur, R. and S. Nolen. 1986. The duration of syllables in American Sign Language. Language and Speech, 29, 263-280.

Wilbur, R. and B. Schick. 1987. The effects of linguistic stress on ASL signs. Language and Speech, 30, 301-323.

ESCOL '90 332-343

# ANY: ITS CONTEXT SENSITIVITY AND MEANING *

Minglang Zhou
Michigan State University

## I. Introduction

In this paper, I propose an analysis that *any* makes two predications, the second of which licenses its occurrence, based on the observation of *any*'s sensitivity to its context. This analysis is in favor of treating *any* as an existential quantifier with a flexibly wide scope , instead of treating *any* as two -- a polarity *any* which is exstential, negative sensitive and a free-choice, universal *any* (Quine,1960; Carlson,1980 &1981; Hornstein,1984; Marcia & Linebarger,1987). This analysis also appears to account for an observation by Davison (1980) and Zhou (1984), and to contradict the claim of *anY*'s distribution limitations (Klima, 1964; Vendler, 1967; Carlson, 1981).

*Any* as a quantifier has a very different behavior as compared with other quantifiers. Quine ( 1960 ) proposed that *any* is a universal quantifier with a wide scope as in the logic form in (1). This scope is wider than that of *every* as in (2). Vendler (1967 ) observed that *any* may not behave like *every* in (3):

(1) John doesn't like *any* books.
( ∀ x ) ~ ( John Like x )
(2) John doesn't like *every* book.
~ ( ∀ x ) ( John Like x )
(3) Take *any* apple.

In (3) one is not offered to take *every* apple. Thus, it is concluded that the scope of *any* can never exhaust the total population in the universe; it can never amount to *every* .

On the other hand, Klima (1964) observed that *any* is usually syntactically derived from an underlying *some* , provided with certain negative triggering elements (4b):

( 4 ) a. John likes *some* rain.
b. John doesn't like *any* rain.

A pre-verbal negative particle may have a final effect on the indefinite quantifier, *any* , thought it is not directly subordinate to the constituent with the negative particle. This, as Klima puts it, is the incorporation of the pre-verbal negative particle into an indefinite quantifier. It is claimed that *any* has a narrow scope like that of *some* 's as in (5):

(5) John doesn't like *any* book.
~ ( ∃ x ) ( John Like x )

It is also noticed that *any* in (6) is existential as is an indefinite quantifier. "It" in (6) requires an existential antecedent, which is fufilled by both *a* in (6a) and *any* in (6b) ( McCawley, 1981).

(6) a. If I write *a* paper, *it* will be on semantics.
b. If *any* rain falls, *it* will be good for the crops.

Regarding this discrepancy, some linguists and philosophers have proposed to treat it as two different homophonic *any* 's; the *any* in (1), (2) and (3) as a free-choice *any* which is universal, and the *any* in (4), (5) and (6) as a polarity *any* which is negative-sensitive and existential (Carlson, 1981; Hornstein, 1984 ).

The problem with these analyses is that they may miss a generalization. Contrary to the 'free-choice' analysis, (3), (5) and (6) clearly show that *any* is not universal but existential. The problem for 'polarity' analysis is that *any* is not only negative sensitive but also positive sensitive. To provide a solution to these problems, I will first demonstrate *any* 's sensitivity to positive contexts, and then try to relate both positive and negative sensitivity in terms of *any* 's second predication in the second section of this paper. In the third section, I will show how the second predication licenses *any* 's occurrence in terms of a filter mechanism.

## II. *Any* 's Context Sensitivity and Second Predication

One additional behavior of *any* is its sensitivity to its positive context, which seems to be ignored by those linguists and philosophiers. Context here is defined as the sentence which contains *any* . *Any* as a quantifier is sensitive to the most marked word in its context (7a), which can be interpreted as having the entailment as in (7b).

( 7 ) a. His English is as **good** as *any* Englishman's.
b. His English is as **good** as an Englishman's whose English is the **best** (or the **best**-educated Englishman's).

Thus, in (7a) *any* demonstrates a sensitivity to " good ", the most marked word, in the context. A "marked" word is defined as the word that has the strongest positive or negative semantic value in the context. This definition needs refining as I proceed. If (7a) is compared with (8a), (8a) does not have such a reading and can only be interpreted as (8b).

(8) a. His English is as **good** as *an* Englishman.
b. His English is as good as an average Englishman's.

*An* is not sensitive to " good " in the context, and just has a neutral reading. Comparisons can also be made with other quantifiers, such as *some* and *many* .

(9) His English is as **good** as *some* Englishmen's.
(10) His English is as **good** as *many* Englishmen's.

It is clear that neither *some* nor *many* is sensitive to " good " in their contexts. "*Some* Englishmen's " and " *many* Englishmen's " English is not necessarily as good, because neither of the two expressions necessarily include the subsets of " best-educated Englishmen /best Englsih". Therefore, (9) and (10) do not have the entailment as (7a) does. Comparisons can still be made with quantifiers, *all* and *every* .

(11) a. His English is as **good** as *all* Englishmen's.
b. His English is as **good** as *every* Englishman's.

(11) have the same entailments (7b) as (7a) does. However, it should be noted that in (7a) and (11) the entailments are assigned in different ways. Although (11) have the same entailment as (7a) does, *all* and *every* do not demonstrate sensitivity to "good" as *any* does in the context. (11) has this meaning representaion in logical form below:

(12) ($\forall$ x) ( Englishmen x ) (His English as Good as x's English )

In (12), $\forall$ x includes all kinds of subsets of Englishmen; best-educated, average and poorly-educated Englishmen. As a result, (11) entail (7b), (9) and (10) by means of quantification. As for (7a), it is assigned the entailment through *any*'s sensitivity to "good" in its context, and therefore, *any* seems to differ from the rest in that it makes two predications as underlined below:

(13) ($\exists$ x)(Englishman x & the best English x )(His English as Good as x's )

The first predication concerning quantification is essential to all quantifiers. The first predication of *any* acts like that of *some* , having an existential property. As Keenan (1971) points out, this existential quantification claims that some object satisfies the operand sentence. The second predication, particularly belonging to *any* , is about size, properties or characteristics of the object denoted by the noun that *any* quantifies. In the case of (7a), the first predication asserts that there is an Englishman, whereas the second asserts that he is the best-educated or he has the best English. If one's English is as good as the best-educated Englishmen's, it is of course necessarily better than those Englishmen's whose English is not as good as the best-educated. Thus, (7a) entails (9) and (10), too. The difference is that *all* and *every* do so in their first predication--quantification, while *any* does so in its second predication which is made through its sensitivity to "good", by means of scaler implicature. The effect of the second predication is misunderstood as quantification so that *any* is taken as universal. In (7a), (13) and the discussion emerges a definition of *any*'s sensitivity, that is, the relation between *any* and a semantically positive/negative element which is able to help specifying the second predication.

If a predicate scale ( Horn, 1972, Gazdar, 1979 and Levison, pp.132-133, 1983 ) is adopted for the above examples, there are two different ordered sets of scalar predicates, (A) for *all* and *every*, and (B) for *any* :

(A) < all / every, many, some/any, a >
(B) < good, average >

(B) shows that (7) has an entailment: "Good" is better than "average" because *any* extends its sensitivity to "good", which is the word in the context that is relatively on the left side of the predicate scale. From here on, a "marked word" is redefined as one on either side of the scale if the predicate scale applies. This kind of marked words are rated in angle brackets. For those words which the scale does not apply to, the old definition of a marked word " the word that has the strongest positive or negative semantic value in the context " is still applicable. The second type of marked words are rated in round brackets.

The marked word that *any* is sensitive to is not necessarily valued on the extreme end of the scale, but could be relatively on one side of the scale as "older" in (14). However, this relatively peripheral position may trigger a left-most shift of the second predicate as "oldest" in (14), depending on the context.

(14) He is **older** than *any* boys who he goes to school with.

*Any* in (14) is sensitive to "older". If it is expressed in predicate scale, its second predicate is matched to the left end: < **oldest**, older, old >, and (14) has the meaning representation in logical form in (15).

(15) a. (∃ x) ( Boys x & Oldest x ) (He Older x )
b. He is **older** than the **oldest** boys who he goes to school with.

With this meaning representation in logical form, (14) has an entailment like (15b), entailing (16):

16) a. He is **older** than *all* the boys who he goes to school with.
b. He is **older** than *every* boy who he goes to school with.

In the examples above, sentence predicates and *any*'s second predicates are identical, ie., "good" = "good". (17) below also serves to show *any*'s sensitivity, but in a different way:

(17) a. The man is **willing** to pay *any* price for it.
b. (∃ x) ( Price x & Highest x) ( Man Willing to Pay x )
c. The man is **willing** to pay the **highest** price for it.

The scale for sentence predicate is: ( willing, unwilling/reluctant ). "Willing" is [+ HUMAN ] and violates subcategorizations if it goes with "price". In this situation, both "high" and "low" are the closest words normally associated with price. In case of a pair of positively marked and negatively marked words, such as "high" and "low", the positively marked one is triggered by the positively marked word on the left side of the scale, while the negatively marked one is triggered by the negatively marked word on the right side . As for (17a), "willing" is on the left side of the scale and so "high" is triggered instead of "low". "Willing" further triggers "highest", as the second predicate, from the left-most of the scale the scale < highest, higher, high, average >. Consequently, (17a) has the entailment (17c) as expressed in its logical form (17b).

Contrary to the above examples, *any* may extend its sensitivity to the right side of the predicate scale in a given context where the marked word is negatively marked as in (18). However, this sensitivity may be confined to the first level, triggering a negatively marked word as the second predicate.

(18) a. He is **reluctant** to give them *any* help.
b.(∃ x) ( Help x & Small x )( He Reluctant to Give Them x )
c. (∃ x) (Help x & Smallest x ) (He Reluctant to Give Them x )

The marked word with a negative semantic value is rated in this way: (willing, reluctant). On the first level, this right-sided or negatively marked word "reluctant" triggers a negatively marked word "small" because of the two commonly associated words ( great, small ) the latter is on the right side. On the second level, the negatively marked word may have a further left shift. However, this further shift may not be necessary, depending on the strength of the marked word. In case of (18a), the right-sided "reluctant" may trigger "small", or "smallest" the left-most one as the second predicate. Therefore, (18a) can have the meaning representations in logical form in (18b) and (18c), and entail (19a) and (19 b).

(19) a. He is even reluctant to give them a small amount of help.
b. He is even reluctant to give them the smallest amount of help.

*Any* may be also sensitive to modal verbs, which are rated as positive or negative as their semantic value is concerned. This point is illustrated in (20).

(20) One of them sent me every sufferer over whom he **might** have *any* influence.

As an expression of possibility, "might" is rated on the right side, having a negative semantic value : ( . . . , may/might ). The second predicate of *any* scales this way: < some, a little, little >, as this is usually how "influence" is measured. "Little" is triggered because it is matched to "might" at the right side of the scale with the representation in logical form (21a) and the reading (21b)

(21) a. (∃ x) ( Influence x & Little x ) ( He Might Have x Over y )
b. One of them sent me every sufferer over whom he **might** have **little** influence.

It is noticed that the second predicate "little" is a quantifier too. However, these two quantifiers function in different ways. *Any* as a quantifier claims the existentiality of some object in the first predication while leaving its second predication open to context, claiming size, properties or characteristics. In certain contexts, *any*'s second predication may claim " a lot " as its size, while in another context like (20) it claims "little" as its size.

Next, *any*'s behavior with explicit negation is examined in the same contexts. Generally speaking, explicit negation triggers a shift opposite to that in the counterpart sentence without explicit negation. (22) is a negation of (14) which is repeated here:

(14) He is **older** than *any* boys who he goes to school with.
< **older**, old >
< **oldest**, older, old >
<- - - - - - - - - - - - - - -

(22) He is **not** older than *any* boys who he goes to school with.
( negative, **not** )
( old, **young** )
------->
< **youngest**, younger, young >
<- - - - - - - - - - - - - - - - - - -

*Any* is sensitive to the most marked word "not" in the context. Since "not" is measured as negative and on the right side, it triggers the negatively marked "young " from the pair at first. The negatively marked "young" has a left shift, and as a result, "youngest" is assigned from the scale as the second predicate. Therefore, (22) has the following meaning representation in logical form (23a) and has the entailment in (23b).

(23) a. (∃ x) ( Boys x & Youngest x ) ~( He Older x )
b. He is **not** even older than the **youngest** boys who he goes to school with.

The same mechanism applies to (17a), as is shown in (24).

(24) a. The man is **not** willing to pay *any* price for it.
( negative, **not** )
( high, **low** )
- - - - - - - >
( **lowest**, lower, low )
<- - - - - - - - - - - - - - -
b. (∃ x) ( Price x & Lowest x ) ~(Man Willing To Pay x )
c. The man is even **not** willing to pay the **lowest** price.

When the *any* -quantified noun has an explicit modifier, this modifier fills in the second predicate position and functions as the second predication. In this context, *any* loses its sensitivity to marked words and stops triggering a second predicate, which will be further discussed in the third part of this paper. In case of an explicite modifier, negation extends its scope to this modifier in an unmarked reading as shown below:

(25) a. I **haven't** read *any* **interesting** books.
b. (∃ x) ( Books x & ~Interesting x ) ( I Have x )
c. I have read some books, but they are not interesting.

(25 a), according to its meaning representation in logical form (25b), has the entailment in (25c), which shows *any* has a wide-scope. However, in case of a marked reading, there is the possibility that negation extends its scope to *any* 's first predication, where *any* demonstrates a narrow scope. as in (26).

(26) a. The student has **not** read *any* good books.
b. ~(∃ x) ( Books x & Good x)( Student Has Read x )

This analysis, relating both positive and negative sensitivity in terms of the second predication, seems to show that there is only one *any* , which is an existential quatifier with a wide scope, although there is some flexibility concerning the scope when markedness is concerned, as shown in all the above examples.

## III. Filter Mechanism and Distribution

Concerning the distribution of *any*, many linguists and philosophers (Klima, 1964, Vendler, 1967, Carlson 1981 ) have observed that *any* may not occur freely in all positions with noun phrases, but no adequate account of this behavior of *any*'s is offered. The following are some often-cited examples that show the occurrence of *any* is not always acceptable.

(27) a. ??*Any* student is in the room.
 b. ??*Any* person must be a doctor.
 c. ??He asked *any* doctor about that.
 d. ??*Any* doctor tells me that.

However, if (27) is compared with (28), I find that whether *any* may appear with noun phrases in a certain positon is not determined by that position per se.

(28) a. *Any* fish is in the water.
 b. *Any* cat must be a mammal.
 c. He can ask *any* doctor about that.
 d. *Any* bachelor is unmarried.

In (28), the sentences comparable to (27) are acceptable. In terms of syntactical categories, (27 a, b, d) and (28 a, b, d ) only differ in their head nouns, while (27 c ) and (28 c ) differ in having or not having modal verbs. This indicates that syntactical positions and categories are not a determining factor of *any* 's distribution, but the semantic relation between the head nouns and the predicates is. Considering the discussion in Section II, I assume that *any* may be sensitive to certain semantic aspects of these words, and that the sensitivity may violate certain semantic configurations when *any* is in combination with one of them. When I try to figure out (27)'s representations in logical form, I find that *any* 's second predicate is unable to be specified as illustrated in corresponding (29).

(29) a. ??(∃ x) (Student x & ? x) ( x In Room )
 b. ??(∃ x) (Person x & ? x) ( x Must Be Doctor )
 c. ??(∃ x) (Doctor x & ? x) ( He Asked x About y )
 d. ??(∃ x) (Doctor x & ? x) ( x Tell y, z )

To solve this problem, two questions need to be answered: (a) whether this unspecified second predicate is acceptable, and (b) what is the meaning and function of the unspecified second predicate. First, in the corresponding meaning representations in logical form of (28a, b, d), I find that this unspecified is acceptable.

(30) a. (∃ x) ( fish x & ? x) ( x In Water )
b. (∃ x) ( Cat x & ? x) ( x Must Be Mammal )
d. (∃ x) ( Bachelor x & ? x) ( x Unmarried )

Second, (30 c) has a specified second predicate since *any* is sensitive to the preceding "can" which has a negative semantic value.

(31) (∃ x)( Doctor x & unqualified/bad x )( He Can Ask x About y )

" Can" with a negative semantic value is on the right side of the scale and triggers a negatively marked word . It is also noticed that "must" in (28b)is a marked word since it is not neutral in meaning, but *any* in these sentences is not sensitive to it. In (28b) *any* precedes the marked word. From this observation , It is concluded that *any* is only sensitive to marked words preceding it.

Having established the unspecified second predicate's acceptability, I am now in a position to answer the second question about the meaning and function of it. A conceivable answer is that a filter mechanism filters every candidate second predicate with the sentence in every possible world. When the sentences in (27) and (28) are compared, it is noticed that (27),(28 a), (28b) and (28 c ) are not analytic sentences, whereas (28 d ) is an analytic sentence. It is established that an analytic sentence is true in every possible world. This leads to the hypothesis that the unspecified second predicate of *any* exhausts the head noun in the universe with a filter mechanism that filters *any* 's candidate second predicates one by one with the sentence in question, and when a second predicate with the head noun makes the sentence anomalous, the sentence becomes unacceptable. It should be noticed that *any* and *all* exhaust the head noun in the universe in different ways: *any* exhausts them one by one, but *all* , as Keenan (1971) points out, exhausts the universe simultaneously. For possibilty sentences such as (28c), it is possible that some possible world will meet their truth conditions. Different from other sentences, a possibility sentence is acceptable if there is a possible world that meets its truth condition.

One important principle in this mechanism is that when it filters the sentence with the candidate predicate, the mechanism rejects a candidate predicate that violates the semantic configuration of the *any*-quantified noun. For example, " ~Animal" is rejected before it is filtered in (32):

(32) a. *Any* cat is a carnivorous mammal.
(∃ x) (Cat x & ? x ) ( x Is A Carnivorous Mammal)
b. *Any* cat (?*which is not an animal* ) is a carnivorous mammal.
?? (∃ x) ( Cat x & ~Animal x) ( x Is A Carnivorous Mammal)

The second predicate in (32b) is rejected because it is contradictory to the properties associated with the noun "cat" that *any* quantifies. However, it is noticed that this rejection may run into the classical problem of meaning, sense vs. reference and descriptionality vs. nondescriptionality (Devitt and Sterelny, 1987; Abbott, 1989). For example, (∃ x) (Fish x & ~ **In Water**) is questionable, but may not be completely anomalous because fish in general lives in water while a particular fish sometimes may not live in the water. This involves sentences like (28 a) and (28b ) which are not analytic sentences, but are generic ones that express properties of the *any*-modified head noun. Contrary to the analytic sentences and possibility sentences discussed above, generic sentences are acceptable if most possible worlds meet the truth conditions. Following this hypothesis, I can try different candidate predicates for the unspecified second predicate, modeling the filter mechanism, in logic form.

(33) a. ??*Any* student is in the room.
(∃ x) ( Student x & Interested x ) ( x In Room )
(∃ x) ( Student x & Concerned x ) ( x In Room )
??(∃ x) ( Student x & ~In Room x ) ( x In Room )
b. ??*Any* person must be a doctor.
(∃ x) ( Person x & Interested x ) ( x Must Be Doctor )
(∃ x) ( Person x & Concerned x ) ( x Must Be Doctor )
?? (∃ x) ( Person x & ~Doctor x ) ( x Must Be Doctor )
c. ??He asked *any* doctor about that.
(∃ x) ( Doctor x & Qualified x ) ( He Asked x About y )
(∃ x) ( Doctor x & Unqualified x ) ( He Asked x About y )
??(∃ x) ( Doctor x & Dead x ) ( He Asked x About y )
d ??*Any* doctor told me that.
(∃ x) ( Doctor x & Qualified x ) ( x Told y About z )
(∃ x) ( Doctor x & Unqualified x ) ( x Told y About z )
??(∃ x) ( Doctor x & Unborn x ) ( x Told y About z )

The above is not an exhaustive list of the predicates that may fill in *any* 's unspecified second predicate position. On the list of predicates, there are problems with some when the truth conditions of the sentences are concerned. For example, "how can a person be in the room that he is not in ?"; and "how can a person who is not a doctor meets the necessity of being a doctor ?". (33c) and(33b) further demonstrate anomalies concerning how a person asks a dead doctor about something and how a unborn doctor tells one something. Those examples indicate that the filter mechanism works in this way: of all the candidate predicates that are filtered in the unspecified predicate position, if one makes the sentence anomalous the *any*-sentence becomes unacceptable, while if none of the candidate predicates makes any anomalous sentence,the *any*-sentence is acceptable(34).

(34) a. *Any* fish is in the water.
(∃ x) ( Fish x & Normal x ) ( x In Water )
(∃ x) ( Fish x & Abnormal x ) ( x In Water )
(∃ x) ( Fish x & Dead x ) ( x In Water )
b. *Any* cat must be a mammal.
(∃ x) (Cat x & Normal x ) ( x Be Mammal )
(∃ x) (Cat x & Abnormal x ) ( x Be Mammal )
(∃ x) (Cat x & Dead x ) ( x Be Mammal )
c. He can ask *any* doctor about that.
(∃ x) ( Doctor x & Qualified x ) ( He Can Ask x )
(∃ x) ( Doctor x & Unqualified x ) ( He Can Ask x )
(∃ x) ( Doctor x & Dead x ) ( He Can Ask x)

d. *Any* bachelor is unmarried.
(∃ x) ( Bachelor x & Bad x ) ( x Unmarried )
(∃ x) ( Bachelor x & Unborn x ) ( x Unmarried )
(∃ x) ( Bachehlor x & Dead x ) ( x Unmarried )

The listed candidate predicates do not falsify nor make (34 d) anomalous because it , as an analytic sentence, is true in all possible worlds. In (34 c) possibility has neutralized all possible predicates. As for (34 a) and (34b ), they express properties of the *any*-modified head noun, which is also difficult to falsify. For example, a normal cat, or an abnormal cat are all cats, and therefore, any of them **is** a mammal.

(35) a. ??*Any* cat was a mammal.
b. ??*Any* cat has been a mammal.

Given (35), a native speaker's immediate response is "Isn't it **still** a mammal?" When given (36) below, his/her immediate response is "A cat **is** a mammal !"

(36) a. ??*Any* cat was mammal.
b. ??*Any* cat will be a mammal.

Another important constraint on this filter mechanism is that this filter mechanism stops working when the noun quantified by *any* has an explicit modifier. Davison (1980) points out that adding a relative clause to the *any* -head noun with an unspecified second predicate can make the sentence acceptable as in (37).

(37) a. ??*Any* student is in the room.
b. *Any* student **who is interested this** is in the room.

Zhou (1984) has also observed that adding modifiers -- adjectives and prepositson phrases -- also makes such sentences acceptable (38).

(38) a. ??*Any* person must buy special clothes.
b. *Any* **tall** person must buy special clothes.
c. ??*Any* idea is rediculous.
d. *Any* idea **like that** is ridiculous.

These observations are best accounted for by the analysis proposed here. By adding an explicit modifier to the *any* -quantified noun, the unspecified second predicate is specified and filled by this modifier. The filter mechanism consequently stopps working when there is no unspecified second predicate. (37b), (38b) and (38d) are acceptable when no unacceptable candidate second predicates are assigned. From this point of view, *any* does not have distribution limitations as Klima (1964), Vendler (1967) and Carlson (1981) observed. With a specified second predicate, *any*-noun phrases can freely appear in any position in a sentence.

However, position does affect the occurrence of *any* with noun phrases. This position is not in the sense of noun phrase positions, but positions in which *any* with a noun phrase is not sensitive to the marked words. A previous example of this kind is (27b) whose *any* precedes the marked words and is not able to specify a second predicate, as further illustrated in (39).

(39) a. He didn't ask *any* doctor about that.
(∃ x) (Doctor x & Unqualitied x) ~( He Asked x About y )
b. ??*Any* doctor was **not** asked about that (by him).
?(∃ x) ( Doctor x & ? x ) ~( He Ask x About y )

(39a) is a negative sentence of (27c), and is a good sentence where the second predicate is specified because of *any* 's sensitivity to preceding "not". When (39a) is passivized in (39b), it becomes unacceptable. In (39b) *any* is not sensitive to the following "not" and has an unspecified second predicate that may make (39b) anomalous through the filter mechanism.

## VI. Conclusion

In conslusion, *any* has a sensitivity to a marked element, marked as measured on either side of the predicate scale or as having a positive-or-negative semantic value, preceding it in the sentence. This sensitivity is the ralationship between *any* and the marked element which can specify *any* 's second predication, in addition to its first -- the quantification. It is through *any* 's sensitivity that the second predication is assigned a predicate. This second predicate, if rated on the extreme left side of the predicate scale, makes entailments through scaler implicature as *all* and *every* do. This is the reason why *any* sometimes looks like a universal quantifier. In explicit/implicit negation, the negative element triggers an opposite shift of the second predicate from its position in the counterpart sentence. Such sensitivity to the negative element and consequent shift keeps *any*'s first predication intact, and thus *any* demostrates a wide scope.

When *any* is in a position where it is not sensitive to the marked element, the second predicate is unspecified. In this context, there is a filter mechanism that exhausts possible predicates one by one with the sentence. A sentence with *any* 's second predicate unspecified is unacceptable if a candidate predicate assigned by the filter mechanism makes the sentence anomalous. An analytic sentence with a second predicate unspecified can not be made anomalous in the candidate predicate assignment process because the sentence is true in all possible worlds. There are two kinds of exceptional sentences: (a) possibility sentences and (b) generic sentences expressing properties of a head noun. In case of (a), a sentence is acceptable if there is some possible world that meets the truth conditions, while for (b) a sentence is acceptable if most possible worlds meet the truth conditions.

The filter mechanism has a constraint that rejects any candidate predicates that are contradictory to the *any*-quantified noun's semantic components. The filter mechanism is cancelled when the unspecified predicate is explicitly assigned. If its second predicate is appropriately specified, *any* may not have distribution limitations. Therefore, the second predication licenses *any* 's occurrence. This behavior of *any*'s also demonstrates that *any* behaves differently from *all* , *every*, and *some* .

## FOOTNOTES

* I am grateful to Dr. Barbara Abbott for her helpful comments on the draft of this paper. Unfortunately, I am not able to incorporate most of the comments into the paper at this point. Errors are of course mine.

## REFERENCES

Abbott, Barbara (1989). Nondescriptionality and Natural Kind Terms. in Linguistics and Philosophy, 12: 269-291.

Carlson, Greg N. (1980). Polarity any is existential. LI 11:4, 799-804.

Carlson, Greg N. (1981). Distribution of Free-Choice Any. In CLS 17

Davison, A. (1980) Any as unversal or existential ? In Van der Auwera, (ed)., The Semantics of Determiners. London: Groon Helm, Ltd. pp. 11-40.

Devitt, Michael and Sterelny, Kim (1987). Language and Reality: An Introduction to the Philosophy of Language. Cambridge: The MIT Press.

Gazdar, G. (1979) Progmatics: Implicature, Presupposition and Logical Form. New York: Academic Press.

Horn, L. R. (1972) On the Semantic Properties of the Logical Operators in English. Mimeo. Indiana University Linguistic Club.

Hornstein, Norbert (1984). Logic As Grammar : An Approach to Meaning in Natural Language. Cambridge: The MIT Press.

Keenan, Edward L. (1971). Quantifier Structures In English. In Foundations of Language 7, 255-284.

Klima, Edward (1964). Negation in English. In J. Fodor & J. Katz, (eds.), The Structure of Language. New York: Prentice-Hall. pp. 246-323.

Levison, Stephen C. (1983). Pragmatics. Cambridge: Cambridge University Press.

Marcia, C. & Linebarger, M. (1987). Negative Polarity and Grammatical Represention. In Linguistics & Philosophy, 10--No. 3.

McCawley, James D. (1981). Everything That Linguists Have Always Wanted To Know About Logic: but were ashamed to ask. Chicago: The University of Chicago Press.

Quine, W. V. O. (1960). Word and Object. Cambridge: The MIT Press.

Vendler, Zeno (1967). Linguistics in Philosophy. New York: The Cornell University Press.

Zhou, Minglang (1984). A Study of the Usage and Sematnic Features of Any in Affirmative Sentences. In Gonggong Yingyu (English for Non-Majors), 1984--1 (Teacher's Edition), 60-65.

ESCOL '90 344-363

# NEGATION AND ASPECT

Alessandro Zucchi
Department of Foreign Languages, Literature, and Linguistics
University of Rochester

## 1. The Problem

Negated achievement and accomplishment sentences (NASs) have mixed aspectual properties. In some respects, they pattern together with stative sentences. For example, sentences (1a-b)

(1)a. ?? For a minute, John crossed the street
b. ?? For an hour, John reached the top
c. For an hour, John was at home
d. For an hour, John didn't reach the top
e. For a minute, John didn't cross the street

show that temporal *for*-phrases are awkward with achievement sentences like ***John reached the top*** and accomplishment sentences like ***John crossed the street***. Sentences (1d-e) show, however, that ***John didn't reach the top*** and ***John didn't cross the street***, as the stative sentence ***John was at home***, are well-formed with temporal *for*-phrases. This behavior of NASs seems to suggest that they are stative. Indeed, this view is sometimes found in the semantic literature. Link (1987), for example, has proposed that NASs describe states of a certain type. Notice, however, that there are also contexts in which NASs and stative sentences part company. Sentence (2a)

(2)a. After Mary was at the hospital, John went to visit her
b. ?? After Mary didn't eat the cake, John left

shows that stative sentences are acceptable in *after*-clauses. One possible interpretation of (2a) is that John's visit occurred after the state of Mary's being in the hospital obtained. NASs, on the other hand, are ill-formed in the same context: (2b) cannot be interpreted as the claim that there is a negative state of Mary's not eating the cake such that John's departure occurred after this state obtained.[1] Thus, the data in (1)-(2) show that an appropriate formal account of the interaction of negation and aspect must achieve the following results. On one hand, it must make sure that NASs and stative sentences share some properties in order to explain their parallel behavior in (1). On the other hand, it must make sure that stative sentences and NASs differ enough in their semantic properties to explain their parting company in (2).

Before I turn to the task of accounting for the data in (1)-(2), I need to qualify my claim that sentence (2)b. is ill-formed.

(2)b. ?? After Mary didn't eat the cake, John left

(2b) becomes more acceptable if uttered in contexts in which there is some expectation that John would eat the cake at a certain time, and, at that time, he failed, or refused, to eat it. Notice, however, that the use of NASs with temporal *for*-phrases is not subject to the contextual restrictions limiting acceptable utterances of negated sentences in *after*-clauses. For example, (1e) is perfectly acceptable also in contexts in which there is no expectation John would cross the street before the time he did. And (1e) doesn't have to convey that John failed or refused to cross the street. This suggests that the well-formedness of (1d-e) and the existence of acceptable utterances of (2b) are accounted for by different uses of negation. In this paper, I'll ignore the use of negation involved in acceptable utterances of (2b).

## 2. Interval Semantics and Aspectual Classes

Taylor (1977) and Dowty (1979) have suggested that Vendler's aspectual classes (achievement, accomplishments, activities and states) may be characterized in interval semantics by the defining criteria in (0):

(0) The Dowty/Taylor Characterization of Aspectual Classes

if S is a *stative* sentence, then S is true at an interval I just in case S is true at all moments within I

if S is an *activity* sentence, then, if S is true at I, S is true at all subintervals of I down to a certain limit in size

if S is an *accomplishment/achievement* sentence, then, if S is true at I, S is false at all subintervals of I

Dowty (1986) has suggested that the negation of any atomic sentence will be a stative sentence according to this classification. Indeed, this is the case if negation is interpreted as follows:[2]

a sentence of the form "$\neg(F^j_n(x_1, \ldots, x_n))$ is true at an interval I just in case "$F^j_n(x_1, \ldots, x_n)$" is false at every $I' \subseteq I$

Given the characterization of aspectual classes in (0), the ill-formedness of sentences (1a-b)

(1)a. ?? For a minute, John crossed the street
   b. ?? For an hour, John reached the top

follows in Dowty's (1979) account from these assumptions:

(a) The sentences *John crosses the street* and *John reaches the top* are accomplishment/achievement sentences.
(b) A sentence of the form "for an hour/for a minute ($F^j_n(x_1, \ldots, x_n)$)" is true at an interval I just in case I is a one-hour/one minute interval and "$F^j_n(x_1, \ldots, x_n)$" is true at every $I' \subseteq I$

By (a), the sentences *John crosses the street*, *John reaches the top* cannot be true at an interval and also at a subinterval of that interval. By (a)-(b), it follows that sentences (1a-b) are thus assigned contradictory truth-conditions. No contradictory truth-conditions are assigned, however, to (1c)

(1)c. For an hour, John was at home,

since stative sentences like *John is at home*, by definition, are true at an interval just in case they are also true at a every subinterval of that interval. Notice, moreover, that given the truth-conditions for negated sentences suggested above, the well-formedness of (1d-e)

(1)d. For an hour, John didn't reach the top
   e. For a minute, John didn't cross the street

is also expected, since the sentences *John doesn't reach the top* and *John doesn't cross the street*, unlike their non-negated counterparts, are stative.

In this account, the pattern in (1) is the result of the interaction of (a) the definition of aspectual classes in (0), (b) the truth-conditions of negated sentences, and (c) the universal force of temporal *for*-phrases. If this insight is correct, it should be preserved by any adequate semantic theory of tense and aspect. Notice, however, that what has been said so far cannot be the whole story about NASs, since one still needs to explain the data in (2) which show that some linguistic environments discriminate between NASs on one hand and stative sentences on the other hand:

(2)a. After Mary was in the hospital, John went to visit her
b. ?? After Mary didn't eat the cake, John left

The Dowty/Taylor definition of aspectual classes in interval semantics and the treatment of negation sketched above do not help to account for the pattern in (2), since this classification, as we saw, assigns NASs and stative sentences to the same aspectual class.

My analysis of (1)-(2) is couched in Kamp's Discourse Representation Theory. Following Parsons (1984), I assume that stative sentences as well as accomplishment and achievement sentences express existential quantifications over event-like entities, or eventualities in Bach's terminology. In short, mine is an attempt to provide an account of (1)-(2) based on assumptions (a) and (b):

(a) Temporal *for*-phrases have universal force in Dowty's (1979) sense
(b) A sentence of the form *x didn't F* is interpreted as the assertion that no eventuality of the kind described by *x F-ed* occurs

## 3. Tense and Negation

For the non-temporal part, I presuppose the version of DRT given in Kamp and Reyle (1990). For the temporal part, I assume acquaintance with Partee (1984) and Hinrichs (1986). The treatment of tense adopted here differs from Partee's and Hinrichs's in some respects. I'll comment on some of these differences in stating the DRS-construction rules.

In order to deal with the problems posed by (1)-(2), I need to describe first how negated and non-negated past-tense sentences are interpreted. In Hinrichs's and Partee's systems, the DRS-construction rules for different tenses are triggered at the S-level by syntactic features Ss carry, like [+PAST], [+PRES], etc. Here, I'll follow Baeuerle (1989) in assuming that the DRS-construction rules for tenses are triggered instead by VP-configurations. This assumption is consistent with Bach's (1980) view that tense is syntactically placed within the VP. I also assume with Partee and Hinrichs that, at the beginning of the application of the DRS-construction algorithm, the empty DRS is not really empty, but contains instead a discourse marker for the reference point (which I indicate with **$rp_0$**) and a discourse marker for the speech point (which I indicate with **now**). Technically, *$rp_0$* and ***now*** are constructed as events with no descriptive content stipulated in the representation. For intuitive purposes, they may be thought of as time intervals. I use '<' for the relation of complete temporal precedence between events, '⊂' for the relation of temporal inclusion. '=' stands for the relation of temporal identity between events.[3] Let's now turn to the sentence *John **reached the top***.

## *4. John reached the top*

I assume that the syntactic configurations in (3) trigger the construction rule in (4):

(3)(i) $[_{VP_{[+PAST]}}[_{V^1}\ [_{V}\text{woke up}]]]$
  (ii) $[_{VP_{[+PAST]}}[_{V^1}\ [_{V}\text{reached}][_{NP}\text{the top}]]]$

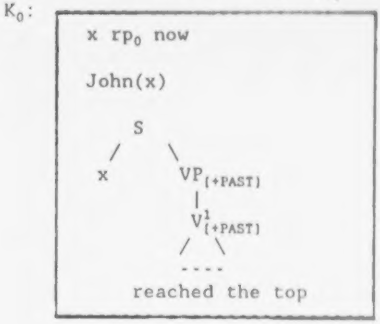
(4) CR-ED
When the configuration (a) $[_{VP_{[+PAST]}}[_{V^1}\ [_{V}\alpha](NP)]]$
is encountered,
1. introduce a new eventuality marker **e** in the universe of the DRS in which the configuration occurs
2. introduce the condition $rp_i$<**now**, where $rp_i$ is the current accessible reference point
3. introduce the condition $e{=}rp_i$
4. replace (a) with the condition $e{:}[_{VP_{[-TENSE]}}[_{V^1}\ [_{V}\alpha]\ (NP)]]]$
5. introduce the new marker $rp_{i+1}$
6. introduce the condition $rp{:=}rp_{i+1}$

The last two steps in the rule have the effect of updating reference point. These steps play a role in the construction of DRSs of multisentential discourses. I'll ignore them when I'll be dealing with discourses consisting only of one sentence. The conditions updating the reference time play a role only in the DRS-construction process and may be deleted when the process is completed.

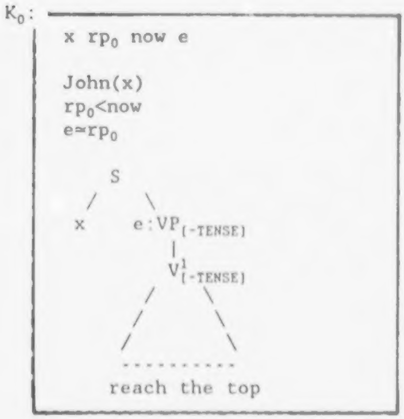
In the case of (5), the rule CR-ED causes the transition from DRS (6) to DRS (7):

(5) John reached the top

(6)


K$_0$:
x rp$_0$ now
John(x)
S
x
VP$_{[+PAST]}$
V$^1_{[+PAST]}$
reached the top

(7)


K$_0$:
x rp$_0$ now e
John(x)
rp$_0$<now
e≈rp$_0$
S
x
e:VP$_{[-TENSE]}$
V$^1_{[-TENSE]}$
reach the top

I now assume that the tree in DRS (7) is reduced further by the construction rule for VPs bearing the feature [-Tense]. This is the rule CRVERB:

**CRVERB**
When the configuration $e{:}[_{VP_{[-TENSE]}} \ldots [[_{V_{[-TENSE]}} \alpha]\ (NP)]]$ is encountered,
1. replace it with the condition $[_{VP_{[-TENSE]}} \ldots [[\alpha(e)]\ (NP)]]$

The result of applying CRVERB and the construction rule for definite NPs to DRS (7) may be written as (8):

(5) John reached the top
(8)

$K_0$:

x $rp_0$ now e y

John(x)
$rp_0 < now$
$e \approx rp_0$
top(y)
reach(e, x, y)

According to the standard truth-conditions for DRSs, DRS (8) is true just in case there is an event e of John's reaching the top occurring at a reference point preceding the speech point.

## 5. *John didn't reach the top*

The DRS for sentence (9)

(9) John didn't reach the top

may now be obtained by assuming that configuration (10) triggers construction rule (11):

(10) $[_{VP_{[+PAST]}}[_{AUX_{[+PAST]}}$ didn't$][_{V_1}[_{V_{[+BSE]}}$ reach$][_{NP}$ the top$]]]$

**(11) CRDIDN'T**
When the configuration (a) $[_{VP_{[+PAST]}}[_{AUX_{[+PAST]}}$ *didn't*$^4$ $[[_V\alpha](NP)]]$ is encountered,
1. introduce the condition **$rp_i$<now**,
   where $rp_i$ is the current accessible reference point
2. replace (a) with condition (b), where e is a new marker

¬

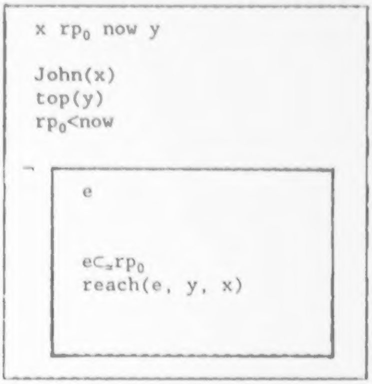
e

$e \subseteq rp_i$
$e:[_{VP_{[-TENSE]}}[_{V^1}[_V\alpha](NP)]]]$

CRDIDN'T, together with the DRS-construction rules specified above, assigns DRS (12) to sentence (9):

(9) John didn't reach the top

(12)



The verification conditions for DRS-conditions of the form ¬K are the standard ones in DRT:

> a function f from the set R of reference markers to the universe of the model M verifies ¬K in M iff there is no function g which extends f such that the domain of g is the union of the domain of f and of the universe of K, and g verifies K in M.

According to these verification conditions, (12) is true iff there is a past reference point r such that no event of John's reaching the top occurs at r or at a subinterval of r.[5] Notice that, according to these truth-conditions, an utterance of (9) does not assert that an eventuality of John's not reaching the top exists (thus, in particular, it does not assert the existence of a state). The truth-conditions of (9) are similar to those conveyed by the formula in (13):

(13) $\exists t\ (t < now\ \&\ \neg\exists e\ (reach(e, j, \text{the top})\ \&\ e \subset_{\approx} t)))$

We can now turn to the DRS-construction rule for temporal *for*-phrases. This will allow us to see how the contrast in (1) may be explained in the analysis sketched so far.

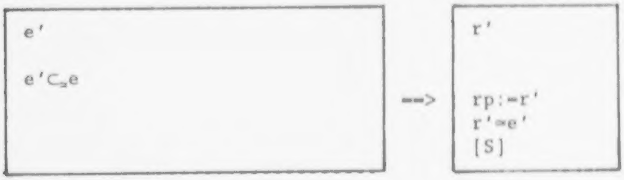
## 6. DRS-construction Rule for Temporal *for*-Phrases

The DRS-construction rule for temporal *for*-Phrases is triggered by syntactic configuration (a):

(a) $[_S[_{TADVP}\text{for } \alpha][_S\ldots]]$

The rule is formulated as in CRFOR:

CRFOR
When the configuration (a) $[_S[_{TADVP}\textit{for } \alpha][S]]$ is encountered,
1. introduce a new eventuality marker e in the universe of the DRS containing (a)
2. introduce the condition $e\subseteq rp_i$
   where $rp_i$ is the current accessible reference point
3. introduce the condition $\alpha(e)$
4. Replace (a) with condition (b), where e' and r' are new eventuality markers:
   (b)



The verification conditions for $K_1 \text{-->} K_2$ are the standard ones in DRT.[6] Given the construction rule CRFOR and the verification conditions for $K_1 \text{-->} K_2$, temporal *for*-phrases have universal force. We may go back to the sentences in (1) to see how CRFOR works.

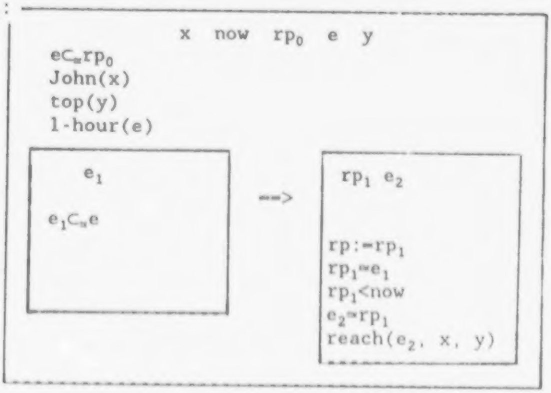
## 7. *?? For an Hour, John reached the top*

The construction rules I am assuming assign the DRS in (14) to (1)b.:

(1)b. ?? For an hour, John reached the top

(14)

$K_1$:



According to the truth-conditions for DRSs, $K_1$ is true iff there is a one hour interval *e* such that every subinterval *e'* of *e* is located in the past and there is an event of John's reaching the top occurring at *e'*.

The awkwardness of (1)b. may now be accounted for as follows. I assume that events of reaching the top are characterized by the property in (15):

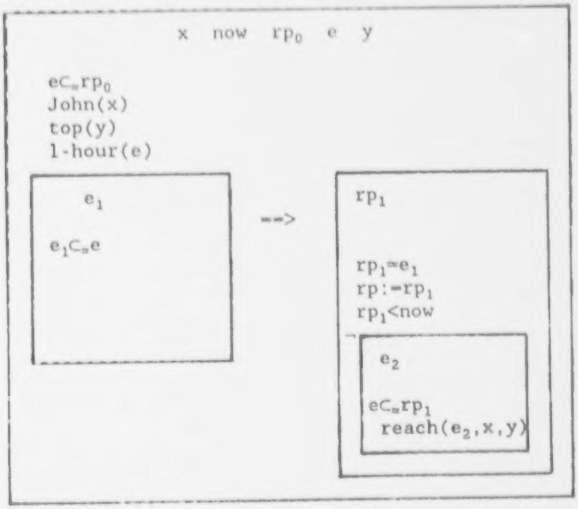
(15) if *e* is an event of x's reaching the top, then there is no proper subpart of *e* which is also an event of x's reaching the top

We may regard (15) as a way of capturing, in an event-based semantics, one of the intuitions underlying the Dowty/Taylor characterization of achievement/accomplishment sentences in interval semantics.[7] Once we assume (15), it follows that DRS (14) (and thus sentence (1)b.) cannot be true simply in virtue of there being an event *e* of John's reaching the top such that *e* takes up a past one hour interval. This is not sufficient to make (14) true, because (14) requires that an event of reaching the top occur at every subinterval of a past one-hour interval, and by (15) we know that this condition cannot be satisfied by proper subparts of the same event of reaching the top: a proper subpart of an event of John's reaching the top, by (15), is not an event of John's reaching the top. We are thus led to the conclusion that, in order for (14) to be true, a different event of John's reaching the top must occur at every subinterval of a one-hour interval, a rather hard requirement to satisfy! In this account, therefore, the ill-formedness of (1)b. is accounted for on pragmatic grounds. Given (15), sentence (1)b. cannot be appropriately used to report that the event of reaching the top took an hour. The truth-conditions associated with DRS (14) predict that (1b) is automatically false in any plausible context of utterance. Let's now turn to (1d).

## 8. *For an hour, John didn't reach the top*

Sentence (1d) is assigned the representation in (16):

(1)d. For an hour, John didn't reach the top
(16)



DRS (16) is true just in case there is a one hour interval e such that every subinterval e' of e is a past interval and there is no event of John's reaching the top included in e'. This means that

(17) DRS (16) is true iff there is a past one hour interval e such that no event of John's reaching the top occurs at e or at a subinterval of e.

Notice that, unlike for (1b), the truth-conditions associated to (1d) by (16) do not make (1d) automatically false in any plausible

**context. According to (17), (1d) is true if John did not get to the top during a past 1-hour period. The contrast between (1d) and (1b) is thus expected.**

## 9. *For an hour, John was at home*

To complete this account of the pattern in (1), I still have to deal with (1c):

(1)c. For an hour, John was at home

I assume that eventualities of being at home have the property in (18):

(18) Let e be an eventuality of x's being at home. For every e' which is temporally included in e or temporally coincides with e, there is a subpart of e which is an eventuality of x's being at home and temporally coincides with e'.

Following my practice of thinking of events with no specified descriptive content as intervals, I may understand (18) as saying that, if e is an eventuality of x's being at home, then for every subinterval t of the interval at which e holds, there is a subpart of e which is an eventuality of x's being at home which holds at t. Again, I take (18) to express in an event-based semantics the intuition underlying Dowty's and Taylor's assumption that, if the sentence *John is at home* is true at an interval, it is also true at every subinterval of that interval.

Sentence (1c) may now be assigned the DRS in (19):

(1)c. For an hour, John was at home

(19)

x now $rp_0$ e

$e \subseteq rp_0$
John(x)
1-hour(e)

$e_1$

$e_1 \subseteq e$

==>

$e_2$ $rp_1$

$rp := rp_1$
$rp_1 \approx e_1$
$rp_1 < now$
$e \approx rp_1$
at-home($e_2$,x)

According to (19), (1c) is true just in case for every subinterval of a past one hour period there is an eventuality of John's being at home which temporally coincides with that interval. Given (18), these conditions are met if there is an eventuality of John's being at home temporally coinciding with a past one-hour period. Thus, the truth-conditions associated with (19), together with the property of eventualities of being at home described in (18), predict correctly that (1c) may be used appropriately to report that the state of John's being at home lasted one hour.

In this account of the pattern in (1), the parallel behavior of stative sentences and negated sentences is explained compatibly with the view that negated sentences, unlike stative ones, do not assert the existence of any eventuality. I now turn to the cases in which NASs and stative sentences do not behave alike.

## 10. Negation and *after*-Clauses

Consider sentence (20):

(20) After Mary ate the cake, John left
(2)a. After Mary was at the hospital, John went to visit her
(2)b.?? After Mary didn't eat the cake, John left
c.?? After John wasn't at home, Mary left

Intuitively, we may describe the truth-conditions of (20) as in (a):

(a) sentence (20) is true iff the sentence *John leaves* is true at a time immediately following the time at which a past event of Mary's eating the cake occurs.

More generally, we may state this intuition about the semantics of *after* as in (b):

(b) A sentence of the form "After $S_1$, $S_2$" is true iff there is an eventuality $\underline{e}$ whose existence is described by $S_1$ such that the nontensed counterpart of $S_2$ is true at a time following the time at which $\underline{e}$ occurs.

The intuitive characterization in (b) of the truth-conditions of *after*, together with our account of negated sentences, suggests also a reason for the awkwardness of (2b-c): negated sentences are awkward in *after*-clauses because they do not describe any eventuality, contrary to what is required by the truth-conditions in (b). Here is how we may try to implement this intuitive analysis.

One problem we face in implementing in a DR-framework this informal account of (20) and (2) is that of expressing in the representation the notion "*e* is an event described by S." Another technical problem is caused by our decision to let the tense rules be triggered by VP-configurations rather than by S-configurations. Intuitively, we may think of the role of the *after*-clause S1 in (a)

(a)$[_{S}[_{TADVP}\text{after } S1][S2]]$

as that of fixing the reference time of the main clause S2. In particular, we should require that the reference time of S2 immediately follow the time at which the eventuality described by S1 occurs. Notice, however, that, if we update the reference point in the representation at the time when the configuration in (a) is met, the new reference point thus introduced is also going to be the current reference point for S1, contrary to our intentions.[8] I'll avoid this last problem by allowing in the representation conditions of the form

rp:= $<e, S_i>$

The role of these conditions is to signal that e acts as the current reference point for construction rules that apply to the main VP in $S_i$. To deal with the first problem, I introduce a modification in the formulation of the tense rules I have assumed so far. Tense rules are responsible for the introduction of the event marker that ends up as the event argument of the predicate introduced by the lexical V. In particular, the construction rule for simple past CR-ED introduces a new eventuality marker in the universe of the DRS in which the configuration triggering the rule occurs (as we can see from step 1 of the rule). The construction rule CRDIDN'T, on the other hand, introduces a new marker in the universe of a negative DRS included in the DRS in which the triggering configuration occurs. I assume now that these rules introduce *distinguished* eventuality markers. Step 1 of CR-ED should now read:"...introduce a new distinguished eventuality marker..." Step 2 in CRDIDN'T should read:"...where e is a new distinguished eventuality marker..." Distinguished markers are underlined in the representation. Intuitively, the reason for introducing distinguished markers is that they allow us to keep track in the representation of the eventuality a given sentence describes. I now allow in the representation conditions of the form:

e sat K1

with the verification conditions in (sat):

(sat) a function f from the set of reference markers R to $U_M$ verifies a condition of the form "e sat K" in M iff there is a g extending f such that the domain of g is the union of the domain of f and of the universe of K and $f(e)=g(\underline{x})$, where $\underline{x}$ is the distinguished marker of $K_1$, and g verifies K

The construction rule for *after*-clauses may now be formulated as in CRAFTER:

**CRAFTER**
Whenever the configuration (a) $[_{S}[_{TADVP}\textit{after}\ S_1][S_2]]$ is encountered
1. introduce new eventuality markers e and e'
2. introduce the condition e sat

| |
|---|
| e" |
| rp:= <e", $S_1$><br>[$S_1$] |

3. introduce the condition rp:= <e', $S_2$>
4. introduce the condition $e \lessdot e'$
5. introduce the condition $[S_2]$

The symbol '$\lessdot$' stands for the relation of immediate precedence as defined in Partee (1984:283).[9] According to this rule, (20) is assigned the DRS (20'):

(20) after Mary ate the cake, John left

(20')

$$\boxed{\begin{array}{l} x\ y\ z\ e_1\ e'\ rp_1\ now\ \underline{e_2} \\ \\ John(x) \\ cake(y) \\ Mary(z) \\ \\ e_1\ sat\ \boxed{\begin{array}{l} e''\ \underline{e_3} \\ \\ rp{:=}\ \langle e'',\ S_1 \rangle \\ e''<now \\ e_3=e'' \\ eat(e_3,\ z,\ y) \end{array}} \\ \\ rp{:=}\ \langle e',\ S_2 \rangle \\ e_1 \lessdot e' \\ e'<now \\ e_2=e' \\ leave(e_2,\ x) \end{array}}$$

DRS (20') is true just in case there is an event of John's leaving occuring at a past reference time that immediately follows an event of Mary's eating the cake.

Notice that, in this account, the ill-formedness of (2b-c)

(2)b.?? After Mary didn't eat the cake, John left
c.?? After John wasn't at home, Mary left

is expected. In this case too, the *after*-clause introduces a condition of the form " e sat K." The construction rules for ***John didn't eat the cake*** and ***Mary wasn't at home***, however, do not introduce a distinguished marker in the universe of K, but in the universe of a negated DRS which is subordinate to K. This reflects the view that there is no eventuality satisfying a DRS K when K is the DRS corresponding to a negated sentence. Given the way we have defined the verification conditions for "e sat K", it follows that the condition of this form in the DRSs for (2b) cannot be verified, since in order for "e sat K" to be verified the universe of K must include a distinguished marker.

To conclude, let me point out some predictions of this analysis of *after*-clauses. First, notice that there is a curious asymmetry between the *after*-clause and the main clause with respect to negation. The pattern in (I)-(II) seems to indicate that negation is problematic in the *after*-clause, but not in the main clause:

(I)a. ?? after John didn't go home, Mary left
b. after Mary left, John didn't go home
(II)a. ?? after John didn't kiss Mary, Bill left
b. after Bill left, John didn't kiss Mary

Notice, also, that in (Ib)-(IIb) the acceptability of negated sentences in the main clause does not seem to be attributable to the ability of main clause negation to take scope over the *after*-clause. If this were the case, we should expect (IIb), for example, to be compatible with the state of affairs in which Bill did not leave, a prediction which seems to me to be incorrect. The truth-conditions of *after*-clauses proposed here, on the other hand, predict that this asymmetry should arise, since, while the *after*-clause is required to describe an event, the main clause is simply required to be true at a reference time that immediately follows the event described by the *after*-clause.

Another prediction concerns the ambiguity of *after*-clauses with stative sentences. Partee (1984), for example, has pointed out that sentence (2a)

(2)a. After Mary was at the hospital, John went to visit her
(III) After John built his house, Mary went to visit him

can be truthfully uttered both in a situation in which John went to visit Mary during her hospital stay and in a situation in which John went to visit Mary after she left the hospital. If the *after*-clause is an accomplishment sentence, on the other hand, this option is no longer available: sentence (III) is true if Mary went to visit John after he finished building his house and false if Mary went to visit him during the construction. In the account I described, this contrast is expected, since an eventuality of Mary's being at the hospital can have a proper superpart which is also a state of Mary's being at the hospital, while an eventuality of John's building his house cannot have a proper superpart which is an eventuality of John's building his house. This difference predicts, on one hand, that the occurrence of John's visit after an eventuality of Mary's being at the hospital should be compatible with Mary's still being at the hospital when John visited her. On the other hand, it predicts that (III) should not be compatible with Mary's visit occurring during the time John was building his house.

## Acknowledgments

Special thanks go to Rainer Baeuerle, Greg Carlson, Angelika Kratzer and Barbara Partee for reading the manuscript and for helpful suggestions. I am also grateful to Anilkumar Belvadi, Dan Ding, Keri Jackson, Janet Hitzeman, and Massimo Poesio for comments on an earlier draft.

## -- Notes --

1. *While*-clauses provide another context in which stative sentences are acceptable, but NASs are not, as the contrast in (i)-(ii) indicates:

(i) while Mary was at home, John washed the dishes

(ii) ?? while Mary didn't eat the cake, John washed the dishes

In Zucchi (1990), however, I argue that (i)-(ii) requires a different treatment from the one proposed here for after-clauses.

2. This way of stating the truth-conditions of negated sentences differs from the one proposed in Dowty (1979). In Dowty's (1979) system, "not-p" is true at I iff "p" is false at I. While this alternative way of stating the truth-conditions of negated sentences does not predict that they are stative (and thus avoids the problem posed by (2)), it fails to account for the behavior of NASs with temporal for-phrases illustrated in (1d-e).

3. I use '≈' instead of '=' to avoid misunderstandings. A condition of the form 'a=b' in the representation requires that a and b be mapped onto the same individual in the model. A condition of the form 'a≈b' in the representation requires instead that a and b be mapped onto events of the same duration.

4. The feature 'BSE' stands for 'basic form' (see Gazdar et Al. (1985:225)).

5. More correctly, (12) is true if there is no past event of John's reaching the top which occurs during the time at which r occurs.

6. f verifies K1==>K2 in M iff for every extension g of f such that $Dom(g) = Dom(f) \cup U_{K1}$ and g verifies K1 in M there is an extension h of g such that $Dom(h) = Dom(g) \cup U_{K2}$ and h verifies K2 in M.

7. An informal suggestion in this sense is made in Dowty (1986:45).

8. This problem does not arise in Hinrichs's and Partee's treatments of *after*-clauses. In these treatments, tense rules are triggered at the S-level, and the construction rule for *after*-clauses may thus perform the double task of fixing the reference time of the main clause and of untensing the after-clause. Partee's and Hinrichs's proposals, however, require spelling out different construction rules for *after*-clauses depending on the tense of the *after*-clause. Thus, it seems to me that, while Partee and Hinrichs do not run into the particular problem into which I am running, this fact cannot be taken as evidence for S-triggering of the tense rule, since their analysis requires an unnecessary reduplication of the construction rule for *after*-clauses.

9. An eventuality e immediately precedes an eventuality e' iff e precedes e' and there is no contextually relevant e" between e and e'. This definition was suggested by E. Klein.

## References

Bach E. (1980) "Tenses and Aspects as Functions on Verb-Phrases," in C. Rohrer (ed.) *Time, Tense, and Quantifiers*, Niemegen, Tuebingen

Baeuerle R. (1989) "Aspects of Anaphoric Reference to Propositions and Events in German", Ms

Dowty D. (1979) *Word Meaning in Montague Grammar*, Reidel, Dordrecht

Dowty D.(1986) "The Effect of Aspectual Classes on the Temporal Structure of Discourse: Semantics or Pragmatics?," *Linguistics and Philosophy*, 5

Gazdar G. et Al. (1985) *Generalized Phrase Structure Grammar*, Harvard University Press, Cambridge, Mass.

Hinrichs E. (1986) "Temporal Anaphora in Discourses of English," *Linguistics and Philosophy*, 9

Link G. (1987) *Algebraic Semantics for Event Structures*, Ms, Universitaet Muenchen.

Kamp H. & Reyle U. (1990) *From Discourse to Logic: Introduction to Model-Theoretic Semantics of Natural Language, Formal Logic, and Discourse Representation Theory*, Kluwer Academic Press, in press

Parsons T. (1984) "Underlying Events in the Logical Analysis of English," in E. LePore and McLaughlin, eds., *Actions and Events: Perspectives on the Philosophy of Donald Davidson*, Blackwell, Oxford, pp. 235-267.

Partee B. H. (1984) "Nominal and Temporal Anaphora" *Linguistics and Philosophy*, 7

Taylor B. (1977) "Tense and Continuity," *Linguistics and Philosophy*, 1

Zucchi A. (1990) "The aspect of negation," paper presented at the third Symposium on Logic and Language, Revfueloep, Hungary